Smithfield Show Review

Tractors and Tractor Implements

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WORLD CROPS

The International Journal of Agriculture

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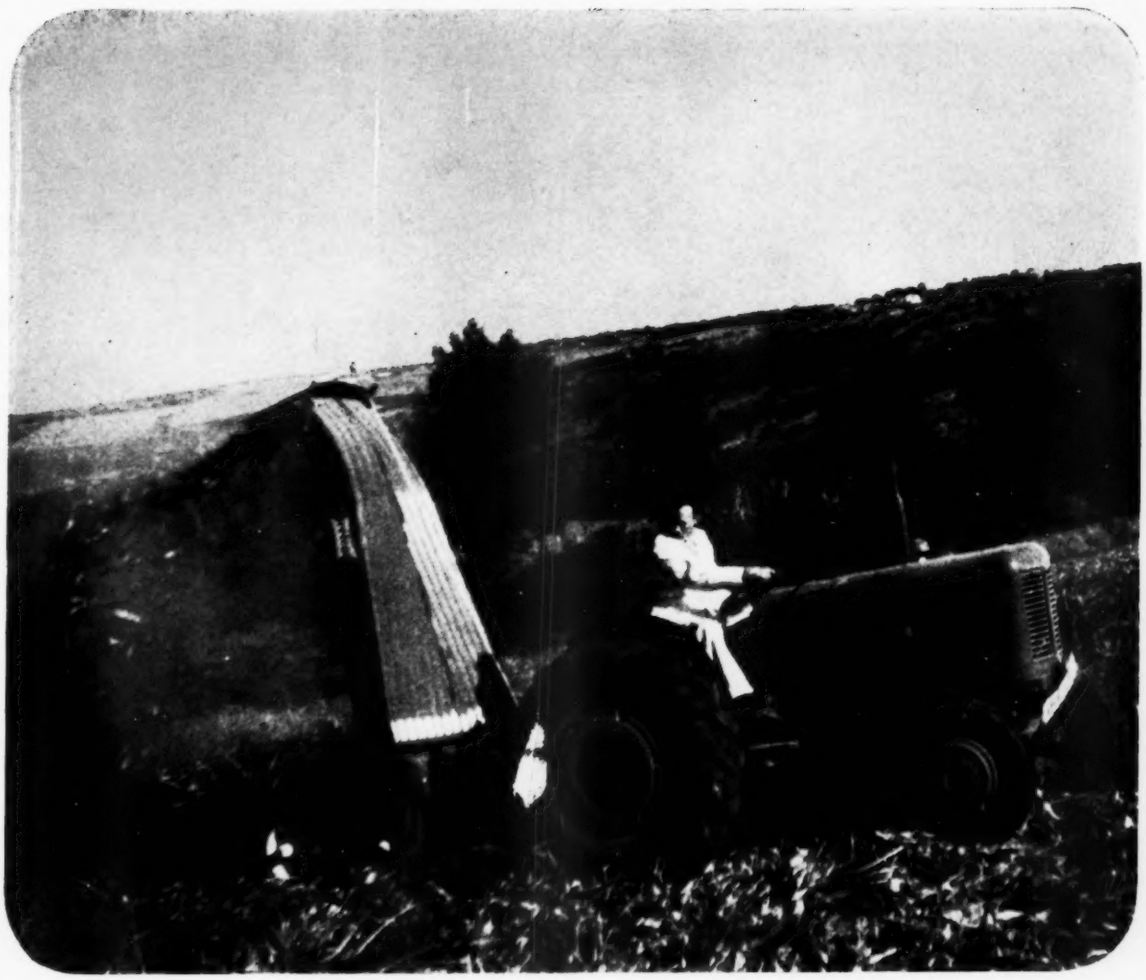

A David Brown/Albion Hurricane forage harvester eradicating old pineapple stems in Cape Province, South Africa

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Justus v. Liebig, Gießen 1842

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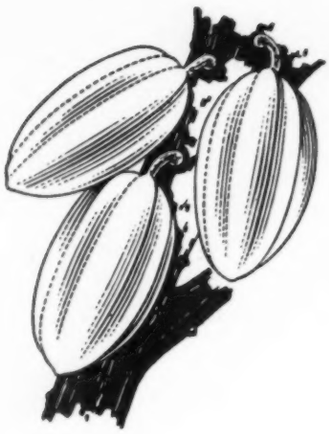

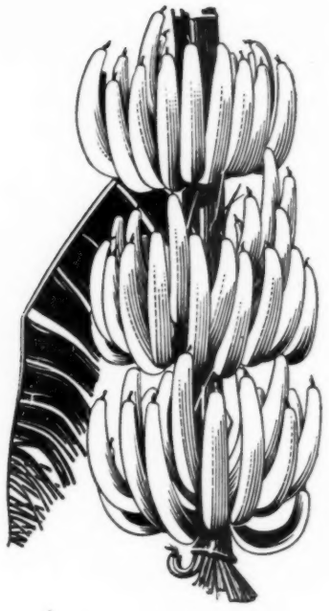

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Editorial Comment

New tractor developments

SOME INTERESTING new developments in the field of tractor design are described elsewhere in this issue. Three articles describe unusual machines being produced in countries most conveniently described as behind the Iron Curtain. On this side of the Curtain there has developed over the last 10 years or so the rear-engined tractor carrying its tools amidships in front of the driver and giving him uninterrupted vision of the zone of tool application, whilst at the same time having precise control over the machine and the work it is doing.

According to Mr. H. E. Ashfield in a paper given last month to the Institution of British Agricultural Engineers, there have been two approaches towards this type of machine. Firstly, the simple powered tool frame, which was, in effect, a mobile hoe, suitable for row-crop work only, developed to meet the needs of the market gardener or the row-crop farmer, *e.g.* the Bean tractor. Secondly, the rear-engined machine, fitted with linkage suitable for taking general-purpose implements, such as the David Brown 2D and the Allis Chalmers model G.

Both these last-named machines were aimed at the small farmer and, according to the speaker, could do, in effect, all that an orthodox tractor of greater power could do, whilst at the same time retaining the advantages of low initial cost, manoeuvrability and low running cost.

Over the years both approaches have had to be drastically modified to meet more and more requirements, and the tool-frame tractor of today is now a machine which offers a complete farming system in itself, as well as being capable of adaptations to suit specialist requirements.

Hasten slowly

Hemin, hemin! (*Sinh.*)

THIS WAS the very sound advice of the late D. S. Senanayake – first Prime Minister of Ceylon – advice which needs to be taken to heart by each and every one of the newly self-governing and independent territories. For you cannot develop a sound national economy in a hurry – you cannot build up light and heavy industries in a predominantly agricultural country without adequate preparation, without the risk, nay the certainty, of serious failures and heavy financial losses, due to bad planning, incorrect siting of factories, incompetence of the management, lack of experience among the foremen and technicians, and lack of mechanical sense and skills among the workers.

In their understandable desire to forge ahead and justify themselves in the eyes of the electorate and of the world, politicians are apt to forget that it took advanced countries, like Britain and America, over 100 years to emerge from a predominantly agricultural economy into a system in which both agriculture and industry are properly integrated, highly organised and highly mechanised. It is obvious that a lifetime of experience cannot be acquired by any form of ' Seven-Year Plan ' or merely through intensive higher academic education in engineering, science or management.

We submit that it takes two generations of primary education, technical training and industrial experience to build up a sound and correctly integrated national economy. Therefore it is necessary to hasten slowly and encourage the continued investment of foreign capital, while the primary and technical education is being built up and extended, and experience is being gained of the full requirements of manufacturing industry, rather than to plunge recklessly into a whole catalogue of new industries by bleeding already existing successful industries – such as tea, rubber, tobacco, cocoa and palm oil, by excessive direct, indirect and concealed forms of taxation to pay for these over-ambitious developments.

Price stabilisation funds

IN THIS connection we criticise the whole policy of withholding surpluses from the producers of tropical products through the operation of the Marketing Boards, which were originally established only for the purpose of stabilising prices. These funds have been allowed to go on accumulating far beyond the requirements of price stabilisation until a point has been reached when governments with over-ambitious development plans arbitrarily decide to syphon off most of the fund for the use of the Central Government.

Plantation owners expect to have to pay export duties, regional produce taxes and company taxes, and these cannot be objected to on principle, so long as they are properly approved by the legislature, though they may and do criticise the extent of this frequently heavy taxation. A plantation run on commercial lines should be permitted to make its own provision against a depreciation in the market price of agricultural products, and contributions to the produce stabilisation funds should certainly never be allowed to degenerate into an additional form of taxation. This would be a breach of good faith.

In general, these Marketing Boards have accumulated rather than disbursed funds and the plantations are thus deprived of funds which are needed for proper maintenance on modern lines for development and for replanting. The Boards' policies are naturally unrelated

to the circumstances of any particular plantation; it is obvious that some plantations will not be able to set aside the necessary reserves to pay for the latest types of agricultural machinery and equipment and still be able to continue to produce at a profit if the present policy is continued.

This process might well be described as 'robbing Peter to pay Paul' or as 'killing the goose that lays the golden eggs'. If such a government wanted to discourage the inflow of foreign capital, they could not do better, but the price will be a high one – nothing less than the collapse of the economy of the nation, where that economy is based primarily on agriculture.

Deadlock

IT IS now three years since Europe was presented with the concept of a European Free Trade Area which would make Europe an economic entity comparable with the U.S.A. It would appear now that these plans are in danger and, even worse, that existing institutions of co-operation, such as the European Payments Union, the OEEC and even NATO, are also threatened, since failure to agree would mean a political as well as an economic division of Western Europe. The threat of disintegration overshadows what was once a grand design for European unity.

The six Common Market nations – Germany, France, Italy, Belgium, Holland and Luxemburg – have decided to cut tariffs among themselves on 1 January, 1959, but awareness has been growing among them of the serious retaliatory measures which the other European nations will be forced to take in self-defence, and it seems probable that agreement will ultimately be reached (see WORLD CROPS, 1958, **10**, 379 and 393).

Weedkillers in conference

THE QUEEN OF WATERING PLACES – Brighton – was the chosen venue for the Fourth British Weed Control Conference, which was attended by nearly 500 delegates from 17 countries. A mammoth programme of three formal lectures and 50 research reports was dealt with both expeditiously and satisfactorily by the 10 sessional chairmen, mainly because of the excellent planning and organisation, but also because they received the full co-operation of the speakers, whose papers were in almost all cases well summarised and clearly presented and, above all, were ready for distribution 10 days before the conference.

The British Weed Control Council and the Society of Chemical Industry, through its Pesticides Group, were jointly responsible for the arrangements. A summary of the principal papers will be given in our next issue, but a few comments on our impressions would be timely.

No new chemical herbicides were announced, but in some ways this is a healthy sign, as it means that the position is being consolidated as a result of the critical analysis of the successes claimed and of the advances which have undoubtedly been made. Serious mistakes can be made if success comes too easily, and, as Holmes has already pointed out, the introduction of a new crop-protecting chemical is, in any case, a very expensive and a very involved business (*vide* WORLD CROPS, 1957, **9**, 451).

It was, in fact, abundantly apparent at the conference that with every fresh advance in the development and application of herbicides a score of new problems will present themselves. Indeed, a halt is now necessary not only to allow research workers to catch up with and digest the vast literature of the new science of weed control, but also to give the extension services time to propagate the essential facts and the farmers time to adjust themselves to a rapidly changing situation and also to prove for themselves that the claims made for the numerous formulations now on the market are, in fact, true. This is sometimes called 'innate conservatism', but it is also sound common sense. Unfortunately, the time lag between the discovery of a new crop-protecting chemical and its general acceptance by the agricultural community may be 10 years or more, and this emphasises the need for dealer and farmer education on an enormous scale. It is perhaps a platitude that agricultural research without the application of the results is merely an academic exercise. Therefore much more emphasis needs to be placed on extension work and agricultural education, for it is surely just as important, perhaps more important, to put over a new idea successfully as it is to invent and develop a new crop-protecting chemical.

There was one important aspect which was touched on by only two speakers and should rightly receive more attention, and that is the question of the economics of the application of the various weed-controlling chemicals. It seems to be far too readily assumed in these days of price subsidies and controlled prices that the cost of expensive chemicals can be passed on to the ultimate consumer, which policy is one of the causes of inflation.

Wild oats at Brighton!

'Few weeds of arable land are so difficult to eradicate as wild oats. . . . Cultural methods are beneficial, but limited in application. Chemical treatments have proved of value in broad-leaved crops, and there is hope that they may yet reduce the weed in cereals . . .'

WORLD CROPS, 1957, **9**, 331.

According to the Weed Control Handbook*: 'Apart from the pre-sowing treatment with TCA . . . no chemical means of control of wild oats can be recommended with confidence, and reliance for their control must be placed on cultural methods'. It was good

* *Weed Control Handbook*. Issued by the British Weed Control Council. Blackwell Scientific Publications, Oxford. 1958. Price 12*s*. 6*d*.

therefore to learn at the Fourth British Weed Control Conference that, as a result of recent research, it has now been concluded by A. F. Murant, J. M. Proctor and W. A. Arnsby that wild oats, *Avena fatua*, in sugar-beet can be reliably and satisfactorily controlled by TCA.

Those who are opposed to any interference with the course of nature may not be impressed by this important announcement. In fact, the Mayor of Brighton, Alderman A. J. Sadler, J.P., went so far as to state categorically that the Prince Regent, who later became King George IV (1762–1830) would have been horrified at the idea. Those of the delegates who were privileged to be invited to enter the famous locked *salon privé* to admire Whistler's famous masterpiece – ' The Spirit of Brighton ' – will understand why.

The language barrier

IN PREVIOUS Editorial Comments we have pointed out that scientists persist in treating English, French and German as official languages, thereby failing to agree on a common world language for scientific purposes. The present dilemma results in the necessity for translating scientific literature into many languages, a task which is steadily falling into arrears. The time lag between the completion of research work and its dissemination is now often a matter of years and results in considerable duplication of effort.

A further suggestion on this subject is made in *The New Scientist*, which points out that the Russian student who hopes to graduate as a scientist is expected to learn English, whereas his British counterpart rarely claims a knowledge of Russian. The proposal is made, therefore, that the Russian language be studied in schools instead of Latin. One infers from this that *The New Scientist* considers that Russian and English are the most useful languages for the scientist. It is true that Russian contributions to some branches of science are of great importance, but there are others where a knowledge of Russian would be of less value than Japanese, Dutch, German or Italian. The scientist cannot learn all these languages, so that a knowledge of Russian will not assist in his approach to the mass of research, published outside that country.

It is to be conceded that the educational value of Latin lies in the training it gives in the exact use of words, which is as important for the scientist as for others, but, it is contended, the Russian language has many of the merits of Latin and, if learned in schools, would greatly increase the number of future scientists having as much access to the results of Russian work as the Russians already have to ours. *The New Scientist* would have us believe that Latin is a dead language. We do not suppose that the physicist or the engineer have any use for Latin and it is no longer a language in daily use by any nation, but science embraces many subjects where a knowledge of Latin is of very real value. Nomenclature in many branches of science is based on Latin, while the botanical description of plants is published in Latin.

While, therefore, we appreciate the value of Russian, we cannot concede the argument that it be learned at the expense of Latin. English and Latin remain the nearest approach to a universal language for scientists, but we still look to UNESCO to obtain agreement between nations on the universal adoption of one tongue to overcome this barrier between scientists.

According to a recent editorial in ' Chemistry and Industry ', the percentage of the world's scientific journals published in a particular language is English 44%, German 14%, French 13% and Russian 8%.

A radio conference

THIS IS an age of conferences and conventions, but only the privileged few can travel many miles by land, sea and air, either at their own, their firm's or the long-suffering taxpayer's expense to participate in these ' tamashas '. One is led to speculate whether the results are worth all the time and the trouble and the vast sums of money that are spent on them. It is certainly not possible to get many of the leading people to attend. Cannot the exchange of ideas which is so essential to ordered scientific progress be achieved in another and a more effective way, whereby the scientists of the world could unite, the leading scientists of the world could speak, and the language barrier could be far more effectively surmounted than is usually the case at these international congresses?

The proposal which we put forward is this. We would suggest for discussion by radio link a theme such as the ' Recent Advances in the Knowledge of Plant Nutrition '. This World Radio Conference could be sponsored some time in 1959 by either FAO, the Bureau of Soil Science or a national organisation, such as the British Association for the Advancement of Science. The arrangements for broadcasting would be put in the hands of the Overseas Service of the BBC; the arrangements for simultaneous translation would be the responsibility of the body organising the radio conference; the necessary linguists, some 20 or 30 in number, would be the only people who would need to travel to the U.K. at the expense of their respective countries. They would, of course, have to be first-class linguists as well as specialists in soil science. This is a rare combination and one not found for 20 or 30 languages in any one country.

The essential idea would be for the leader in each participating country to give a brief account, mentioning names, of work completed and conclusions reached during 1958. He would speak through the radio link to London. Here his address would be translated into the 20 or 30 languages and then broadcast simultaneously on the various national wavelengths or else these translations could be recorded for

subsequent transmission on a later occasion, owing to differences in time. The leaders in other selected countries would each in turn give a similar account of recent advances in their countries. It would not, of course, be possible for every one of, say, 100 countries to participate actively, nor would it be necessary, but the significant achievement would be that it would be possible for scientists in many countries to learn, for the first time, what has been achieved in Russia, in Japan, in India, in Australia, in Poland, in Germany, in France, in Italy, or in the U.S.A. As things are today, perhaps 90% of the world's scientific work is wasted either because of faulty translation or non-translation, or because it is lost in some obscure national publication, or because of the inevitable time-lag in the publication of translated abstracts.

Television press conference

AN ACTUAL EXAMPLE of how it is possible to reach a wider audience in the modern way was the inter-city television press conference recently arranged by Fisons Pest Control Ltd. In collaboration with Messrs. Pye Ltd., a programme of 60 minutes' duration was sent out on closed circuit television to audiences of Government officials, extension officers, agricultural merchants and farmers gathered together in public rooms at London, Lincoln, Edinburgh, Manchester and Bristol from Chesterford Park Research Station, where the press conference was held. In this way were brought together a very large audience, who normally would not have been able to go to Chesterford Park for reasons of geography and time. We believe this to be the first time in Britain, perhaps in the world, that an agricultural press conference has been held in this way.

The subject under discussion was the new compound selective weedkiller – Fisons 18-15 – which since the last press conference has been used on from 100,000 to 200,000 acres of cereals in Britain. It is hoped to include an account of the results of this work in our next issue.

Sweet flag

SWEET FLAG, *Acorus calamus*, indigenous to North America, Eastern Europe and Central Asia, is a semi-aquatic herb with creeping, much-branched rhizomes containing 1.5 to 3.5% aromatic oil, from which has been isolated asaryl aldehyde and an amorphous bitter glucocide, acorin. The plant thrives in heavy loams and alluvial soils and under cultivation yields about 1½ tons of dry rhizomes per acre.

In the East the rhizomes have for centuries been used as a drug, also as an antidote to croton poisoning, while elsewhere its properties as a carminative and as a stimulant to increase the appetite have been recognised. More recently its insecticidal properties have been more widely appreciated. In Asia the dried rhizomes are reduced to a powder and used against various household insect pests.

Experiments at the Central Rice Institute, Cuttack, India, show that the powder is effective in killing insect pests in stored paddy and it is stated to be better than the chemicals, commonly used for this purpose. The powder is used at the rate of 2 lb. to every 100 lb. paddy. It is claimed that grain so treated possesses no unpleasant odour when cooked after storage for a year. Presumably the powder is removed in washing the rice before cooking and in the cooking water.

Man's inhumanity to Man

'. . . *and yet it moves*!'
Galileo Galilei (1564–1642)

Boris Pasternak, aged 68, Russia's greatest living writer, has been awarded the Nobel Prize for Literature by the Swedish Academy.

In accepting the award, Pasternak said he was 'immensely grateful, touched, proud, astonished and abashed'. Four days later he sent another telegram refusing the Prize. He gave as his reason the manner in which the award had been interpreted 'in the society to which I belong'. The message, in French, concluded: 'Please do not receive my voluntary rejection with displeasure'.

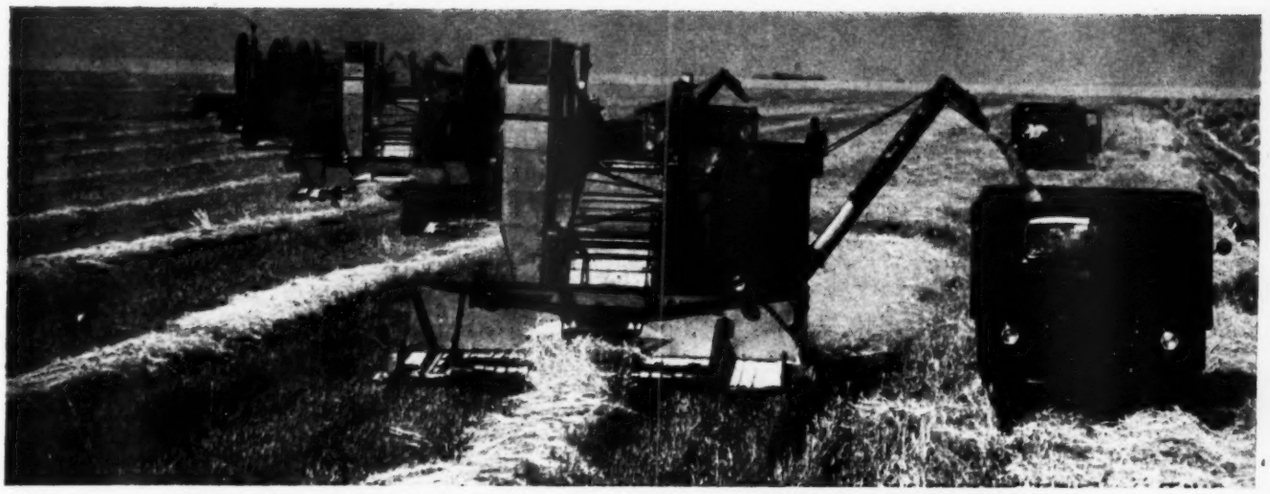
The award aroused such a storm in Russia, mainly on political grounds, that he had either to abandon his family and leave the country of his birth or recant – and he naturally recanted. What was his crime? He had written a novel† in which, among other things, he had had the temerity to suggest that free human personality was greater than the Communist system of living. All this means that this system cannot face free criticism and survive.

Yet one can recall the fact that Karl Marx, a nationalised citizen of a democratic country, was given free access to the library of the British Museum to prepare an attack on the economic system of his adopted country. His book, 'Das Kapital', has been, and still is, used as a textbook in schools and colleges as the considered work of a thoughtful man, however erroneous his conclusions might be. The contrast is, however, as significant as it is important.

All this brings to mind the occasion when the famous astronomer, Galileo, was summoned to Rome at the age of 72 and made to recant his ill-starred but immortal work, '*Dia logo dei due massimi sistemi del mondo*', in which he put forward the two heretical propositions (1) that the sun was the centre of the universe, and (2) that the earth rotated. The legend has it that after repeating the formula of abjuration he was heard to murmur: 'Eppur si muove!'

As with Literature, so with Science – Truth will prevail.

† *Dr. Zhivago*, by Boris Pasternak. Collins, 1958. Obtainable through Technical Books, 308 Euston Rd., London, N.W.1



Wheat. A team of combine-harvesters at work in the vast wheatlands near Regina in Canada

*The State of World Agriculture**

THE year 1957–58 saw the first check in the steady expansion of world agricultural production since the war, and the preliminary FAO index of world agricultural production (average 1952–53 = 100) fell back to 119 against 120 in the previous year.

Agricultural production continued to increase in the Near East and more slowly in Europe, the U.S.S.R. and Latin America. In the Far East there was no increase over the record level of 1956–57, while in Africa, Oceania, and especially in North America, agricultural production was appreciably lower than the year before.

In North America a poor grain crop in the Canadian Prairie Provinces coincided with the reduction in acreage of cotton and tobacco under the Soil Bank programme.

Mounting surpluses

In the economically more advanced countries, agricultural policies are increasingly dominated by the problem of agricultural surpluses. Although improvements in agricultural methods make it relatively easy to step up production, such expansion must be restrained in view of mounting surpluses.

A review of surplus disposal operations in recent years indicates that some 30–40% of United States agricultural exports are currently shipped under special programmes. In spite of measures to restrain production and vigorous campaigns of surplus disposal,

World agricultural production, in general, declined slightly in 1957–58, marking the first check in steady expansion since the war. Despite the measures taken to restrain the production of wheat, stocks remained roughly at the same level as a year ago. The purchasing power of agricultural products in terms of manufactured goods fell for the third year in succession.

world stocks of agricultural products at mid-1958 showed little change from a year earlier. They now amount to about 10% of world agricultural production, and about three-quarters are held in North America.

Wheat stocks fell by some 5 million tons or 10% during 1957–58, mainly because of smaller crops in North America, but are likely to rise sharply in 1958–59. Stocks of coarse grains in North America rose by nearly a quarter to the record level of over 60 million tons and are likely to rise further in 1958–59. Stocks of cotton in the United States, however, have been reduced by some 40% from the peak levels of mid-1956. There was a renewed rise in world stocks of butter in 1957–58 and a rise in stocks of coffee, after a temporary decline in 1956–57.

Unsatisfied demand for food

The situation is very different in the less developed countries. Small rises in income lead to relatively sharp rises in demand for food, which are superimposed upon the increase due to the rapid growth of populations. On the other hand, in many countries primitive methods of agriculture, together with lack of capital, obsolete systems of land tenure and other institutional difficulties, make it hard to expand production to meet this rapid growth in demand. Measures for agricultural expansion and general economic development have been hampered by shortages of investment funds, largely because of declining earnings from exports.

Unsatisfied demand for goods

A number of changes have been announced during the year in the agricultural policies of the communist group of countries, especially the U.S.S.R., as part of the drive to meet the unsatisfied demand for consumer goods. In many instances prices to farmers have been raised and the collection and sale of agricultural products simplified. In the U.S.S.R. the

* Summary of the report to the FAO Council, *The State of Food and Agriculture*, 1958. In English, French and Spanish. Pp. 222. Price U.S. $2.50, 12*s.* 6*d.*, or local equivalents.

machine tractor stations are being disbanded and their equipment sold to collective farms, which are to have greater autonomy in future.

Prices and prospects

The FAO index of average export unit values of agricultural products for the year 1957 as a whole (average 1952–53 = 100) at 95 was three points higher than in the year before, but prices of manufactured goods on world markets rose still more. The average purchasing power of agricultural exports for manufactured goods therefore fell for the third year in succession and, in comparison with the period 1952–53, the average purchasing power of agricultural products has now fallen by about 10%. The recession in the U.S.A. and the slowing down of economic expansion in Western Europe led to some weakening in demand for agricultural and forest products. The immediate outlook in the more industrialised countries seems to promise no more than a maintenance of the level of economic activity of early 1958, but a recovery in 1959 is expected.

Cereals

Wheat

Wheat supplies in 1957–58 were much the same as in 1956–57. Stocks in the four major exporting countries at the beginning of their respective trading seasons were practically unchanged at nearly 48 million tons, despite the large volume of trade in 1956–57, declines in the U.S.A. and Australia being offset by increases in Canada and Argentina.

World production in 1957–58, estimated at 123 million tons, showed no change, but there were significant shifts in the distribution of production. Output in Western Europe, due mainly to more normal acreage in France and a large crop in Yugoslavia, increased 7.8 million tons, while it declined 10 million tons in the four major exporting countries. In Canada, lower yields reduced output by a third, but in the U.S.A. output fell by only about 5.5%, despite an 18% reduction in acreage. The Australian crop declined for the second successive year and resulted in a shortage of wheat for export.

Coarse grains

Supplies of coarse grains in 1957–58 were much larger than in 1956–57; stocks from the previous season in North America were nearly 8 million tons higher and world production rose by about 4 million tons to a record level.

Production in Canada declined 25%, due to lower yields, but in the U.S.A. output of sorghum increased by 9 million tons, and barley and oats by 3.4 million tons, while maize output declined by 1.3 million tons, due to acreage reduction under the Soil Bank scheme. In Argentina, while the production of small coarse grains fell, a maize crop of nearly 5 million tons (compared with 2.7 million tons last year) was harvested; the maize crop in the Union of South Africa was also good. In the Near East, larger supplies became available for export, and there was a fall of 4.5 million tons in French output of barley and oats.

Rice

There were smaller crops in South and South-East Asia in 1957–58. The two leading exporters, Burma and Thailand, suffered particularly heavy losses, while rainfall was inadequate in North-East India, and Ceylon was afflicted by both drought and floods. Crops in the Asian temperate zone were good, especially in Japan. Outside Asia, Egypt was the only important exporter to harvest substantially more rice than in 1956–57. The U.S.A. and Italy both produced less, mainly because of acreage restrictions.

The relative scarcity of rice this year is probably a temporary phenomenon. When production recovers, it is likely that markets will be able to absorb the rice produced, since consumption will continue to increase as a result of the rise in world population and incomes.

Photo: FAO

Rice. An Indonesian girl harvesting rice by hand – one head at a time – using a 'tupai'. Rice is the staple food of more than one-half of the world's people

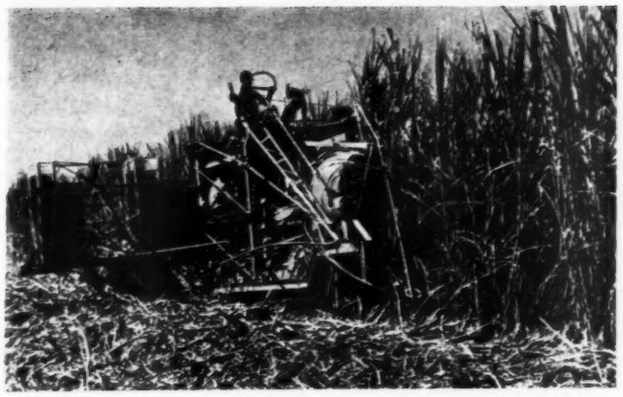
Oils and fats

Butter

In 1957 world milk production rose by 2%. In the economically developed countries, in spite of reduced cow numbers, increasing yields and higher butter-fat content lead to an increase in the production of butter and other dairy products.

Recent events demonstrate clearly that in these countries the dairy economy is getting out of balance. Various incentives, such as price support policies, export subsidies or import limitations, have led to production of butter in excess of demand, countries in which a large part of dairy incomes is normally derived from export sales being most affected.

In the majority of the underdeveloped countries, however, policies are necessarily aimed at development



Sugar. This self-propelled combine can harvest the crop at high speed. Afterwards the cane is burnt with a flame gun to reduce its bulk

Photo: U.S.I.S.

of the milk industry. A sharp increase in the production of milk and dairy products is taking place in some Eastern European countries, particularly in the U.S.S.R.

Oils and oilseeds

In 1957 world production rose by 4% to nearly 27 million tons. The Nigerian groundnut crop, however, was very poor; copra supplies for export and palm kernel sales to the Nigerian Marketing Board were both reduced. Tallow supplies in the U.S.A. were lower and her exports of soybean oil dropped sharply. In some countries with a low level of fat consumption, such as India and China, larger quantities of fats were consumed and domestically exports showed a sharp decline, even although production was apparently greater than in the previous year.

Supplies will continue to be large in 1958, particularly of liquid edible oils, and U.S.A. production of animal fats and soybeans is forecast at near-record levels.

Plantation crops

Tea

World production in 1957 was approximately 700,000 tons, 3% above the preceding year. This was the net effect of a reduction in North India and Pakistan, an increase in South India, Indonesia and Africa, and a record crop in Ceylon. Higher production was not matched by higher exports. India, which had shipped unusually large quantities during the Suez crisis, exported in 1957 only about 40,000 tons, 17% less than in 1956. Pakistan exports fell to one-third. Exports from Ceylon, Indonesia and Africa, on the other hand, were maintained. Total world exports are estimated at around 470,000 tons, 9% below 1956.

End-of-year stocks in producing countries were estimated at 80,000 tons, as compared to 65,000 tons a year earlier. U.K. stocks were not excessive.

Output in 1958 may not reach last year's high level because of the droughts in 1957 in India, Pakistan and some East African growing regions. The 1957 record crop in Ceylon is unlikely to be exceeded, although the floods at the end of 1957 apparently have done little harm in the tea-growing areas.

In the less immediate future two important factors are rising costs of production and the slow growth of consumption in importing countries. The formation by the Indian Government of a Promotion Committee to help expand internal consumption and the establishment of a replanting fund in Ceylon to rehabilitate low-yielding areas are measures taken to meet these developments.

Prospects are difficult to assess. At current prices a modest decline in consumption has started. Two other factors which will affect the outlook are the size of the Brazilian winter crop and the prospects for the 1958–59 crops in Africa; if these crops are average, world supplies may be slightly above 800,000 tons, which would be below the high 1956–57 level, but substantially more than last season.

Sugar

In 1957, world sugar consumption continued to rise, though more slowly, reaching 34 million tons. All regions, except North and Latin America, showed gains; the increases have been more marked in the low-consumption countries of Asia and Africa and in Western Europe.

It is expected that production in

Photo: Federation of Rhodesia and Nyasaland

Tobacco. A fine stand on a farm in Southern Rhodesia. Virginia flue-cured tobacco comprises the bulk of the production in the Federation, which last year amounted to 148 million lb.

1957–58 will be 35.6 million tons. Western Europe is expected to produce 7.1 million tons, 600,000 tons more than last year, mainly reflecting increases in Western Germany and France. In Cuba a presidential decree fixed production at 5,667,000 metric tons, while Mexico, Brazil, Peru and Indonesia together will probably produce about 500,000 tons more than last year. As a result, international prices continued to decline in early 1958.

Tobacco

In 1957, the upward trend in world production was checked, mainly as a result of a reduction in the U.S.A.; output in the Federation of Rhodesia and Nyasaland was also smaller. On the other hand, world production of Oriental-type cigarette leaf rose sharply to a new record level. The increase was mainly in Greece and Yugoslavia, where plantings were larger and yields higher. Consequently, while exports of flue-cured tobacco will be lower, exports of Oriental leaf are expected to rise. For the 1958 production season now in progress, output in Rhodesia recovered almost to the record 1956 level of 95,000 tons, but planting intentions in the U.S.A. point to a further slight reduction in acreage.

Coffee

World production in 1957–58 is likely to approach 3 million tons as a result of a 300,000-ton increase in the 1957 Brazilian harvest over the low crop of 1,066,000 tons in 1956, and higher output in some other Latin American countries and in Africa. In Central America and Mexico, production showed little change. World trade in 1957 lagged behind this increase in production and prices fell.

The outlook for 1958 is overshadowed by a foreseeable rise in world production as a result of exceptionally large crops in Brazil – where the 1958 harvest is forecast at 1.5 million tons – and in French West Africa and some further expansion in other countries. The total Brazilian carry - over amounted to more than 800,000 tons by 30 June. Remedial measures are the establishment of soluble coffee industries in producing countries and the intensification of trade relations with Eastern European countries.

Cocoa

After several years of steady expansion in production and a marked rise last season, the 1957–58 crop was one of the poorest in 10 years. Bad weather and disease has reduced output in all the main West African producing countries. Ghana and Nigeria are expected to produce only 205,000 and 86,000 tons respectively, compared with 268,000 and 137,000 tons last year; production in the French territories will be around 110,000 tons, 30,000 tons below 1956–57; and Sao Tomé, Sierra Leone and Spanish Guinea will also show declines. In Latin America, Brazil is the only country where production is expected to decline, and this decrease will probably be offset by slight increases in all other countries of the region. The final figure for world production in 1957–58 will be about 750,000 tons, 17% below the 1956–57 level.

Rubber

Production of natural rubber, at 1.9 million tons in 1957, was substantially unchanged for the second year running. There was some improvement in Malaya, due to increased output from estates, and also in Ceylon. Estate production in Indonesia, however, continued to decline, being scarcely offset by a small increase in smallholders' output.

Expansion in rubber requirements seems fairly well assured, although in the past 10 years the consumption has increased faster than that of natural rubber.

There has for some time been extensive replanting with high-yielding trees both in Malaya and Ceylon, and special schemes encourage this development among smallholders. Output in these countries is likely to keep pace with demand during the next decade, but Indonesia is likely to hang back pending more extensive replanting under more settled conditions.

Fibres

Wool

World supply of wool is estimated to have been slightly smaller in 1957–58 than in 1956–57, with lower opening stocks. A decline in world consumption began in mid-1957, but long-term prospects for the consumption of wool are good so long as standards of living continue to advance.

Cotton

World supplies, *i.e.* production

Rubber. An early-morning scene on an estate in Malaya, showing a Tamil tapper collecting the latex from a rubber tree. Some 40% of the world's rubber is produced in Malaya

during the season plus stocks at the beginning of the year, were lower in 1957–58 than in 1956–57. Production fell from 8.95 to 8.52 million tons, mainly because of the smaller crop in the U.S.A., but elsewhere there was a slight increase in production.

The production outlook is uncertain. U.S. acreage allotments remain at the minimum and next season's crop is not expected to exceed 2.3 million tons. However, a moderate increase is forecast in the production of other countries. Any increase in the world crop is therefore likely to be modest, and output may well remain below consumption.

Cotton. A gargantuan monster – a McCormick Deering cotton picker in the U.S.A.

Photo: U.S.I.S.

Jute

Supplies available in 1957–58 were much the same as in 1956–57, with only small changes in stocks and production. The crop is estimated at about 1.2 million metric tons in Pakistan and 740,000 tons in India. In addition, India produced 220,000 tons of mesta (an allied fibre). Output in minor producing countries (Brazil, Taiwan, Nepal, Burma) was practically unchanged. Production figures are not available for China, where production has risen considerably in recent years.

If official objectives are realised, the 1958–59 season should see a significant reduction in the Pakistani jute crop – acreage for only 1 million tons having been licensed – and an almost equally significant expansion in the Indian jute crop, where an increase of about 20% in output is projected. Actual production, however, tends to be determined by the relative advantages of planting jute or rice.

Expectations of bumper harvests in both India and Pakistan at the beginning of 1958–59 point to some increase in the crop, since both Pakistan and India have long-term plans for increased output.

Hemp

Hard fibre production reached a new record of some 825,000 tons in 1957, but has tended to level off in the past two years. Abacá output, at about 140,000 tons, fell slightly, due to a reduction in Philippine production; output in North Borneo and Central America increased. Sisal production (over 500,000 tons) increased slightly because of larger crops in Brazil and Portuguese Africa. Henequen production rose slightly to 120,000 tons, due to larger cuttings in Mexico.

Sisal consumption was at a peak in 1957, while the supply of henequen tended to be excessive, with the excess concentrated in Mexico. Operations on estates where production has become uneconomic, especially in Indonesia, are being curtailed, while production capacity in some other areas, notably Brazil, is becoming fairly fully utilised.

Fruit and wine

Apples and pears

International trade in apples and pears in 1957–58 was characterised by an increase in imports into Europe, as a result of poor domestic crops. Total apple production decreased by 24%, and world output of pears was 15% lower. In view of the scarcity of domestic supplies, several European countries relaxed import restrictions and temporarily reduced or abolished import duties.

Citrus

World production of oranges in 1957–58 was 14 million tons, about the same as in 1956–57. The recovery of orange trees from the 1956 frost in Spain was rapid and production and trade rose almost to previous levels. The increase in Mediterranean and Brazilian production was counterbalanced by a decline in the U.S.A., where frost in Florida caused a loss of 780,000 tons of oranges and tangerines.

World production of lemons was not much different from last year's output of 1.9 million tons, but grapefruit production is expected to decrease. Quick recovery of orange and grapefruit production in Florida is unlikely and less than normal supplies are expected in 1958–59. Production in the Mediterranean, South Africa and South America should increase when new plantings reach the bearing stage.

Tropical fruits

Date production in 1957 is not yet known, but world output is not likely to be much changed. Small crops and depleted stocks in Iraq account for the major part of a decrease in exports.

The International trade in bananas expanded further in 1957, but extensive storm damage in some countries will probably reduce output in 1958.

Dried fruit

World production of raisins in 1957–58 was about 520,000 tons, 10% less than the year before. U.S. production continued to decline and there was a poor crop in Turkey. Output of currants was also reduced because of a small crop in Greece, the largest producer.

World wine production was about 50 million hectolitres, nearly 25%, lower in 1957 than in 1956. Production fell by about 38 million hectolitres both in France and Italy, with a smaller decline in Spain, Algeria and Portugal, totalling about 10 million hectolitres. German production recovered, but was still below average.

Forest Products

Sawmilling, the oldest of the major forest industries, is still the most important, followed by the pulp and paper industry, the plywood industry and paper board manufacture. Generally speaking, the younger the industry the more rapid its current growth rate, which is leading to a change in the pattern of raw material requirements from the forest.

In recent decades this pressure on the forest resources has helped to promote forest conservation and sound forest practice. This favourable trend

Photo: Vickers-Armstrong Ltd.

Timber. Deep in the heart of a Tasmanian forest. A heavy crawler tractor dwarfed by the giants which surround it

has been facilitated by advances in forest science and by a more widespread understanding of the multiple role of the forest.

Apart from the huge areas of forest still untapped and the new forest resources which must be created in certain areas, there is today, even in the countries most advanced in forestry, a considerable gap between the actual and potential yield of the forest.

Roundwood

In 1957, world roundwood production was about 1,560 million cubic metres, as against some 1,590 million cubic metres in 1956. Production of sawlogs, notably in North America, but also in Europe, declined and in North America pulpwood fellings were also reduced. A relatively small increase was recorded in roundwood production in the U.S.S.R. and Asia.

For 1958, although the raw material required by certain forest industries for current production may be smaller than in 1957, particularly in Europe, a small increase in world roundwood production is foreseen, since mill stocks, depleted in 1956–57, have to be replenished.

Sawnwood

In 1957, North American output of sawnwood dropped by 11% compared with 1956. In Western Europe the fall was almost 4% and in Latin America close to 3%. Elsewhere there was a slight increase, the overall effect being a fall of over 3% in total world production.

The outlook for 1958 is that total world demand, as well as output, is likely to show a further decline in 1958. Further developments depend chiefly on the general state of industrial and economic activity in North America and Europe.

Wood pulp

A sharp check to the post-war rate of growth in the pulp, paper and board and fibreboard industries took place in 1957. World production of wood pulp increased in 1957 by less than 1% compared with an increase of close to 7% in 1956 and about 8% annually from 1947 to 1955. World pulp production, nevertheless, passed, for the first time in history, the level of 50 million tons. The outlook for 1958 is that production will be at the same level as in 1957.

Newsprint

In 1957, world production of newsprint rose by some 300,000 tons to 12.3 million tons.

Reduced demand in the U.S.A. led to a gradual accumulation of stocks there toward the middle of 1957, when they reached record levels. The immediate effect was a gradual curtailment of Canadian output; production in the U.S.A. further increased, giving a small rise in total North American output for the year as a whole.

Consumption in the United States, which accounts for about half of total world consumption, was at a lower rate in the first half of 1958 than in 1957. The longer-term outlook, however, is favourable as population grows and consumption increases.

The changing situation in the world newsprint market in 1957 affected the output of mechanical pulp and particularly the production of market pulp, which was heavily curtailed towards the beginning of 1958 in the principal exporting countries, notably Finland and Norway.

Other paper and board

In 1957, world production of paper (other than newsprint) and board (paper and fibreboard) further rose, by over 1.1 million tons, to about 52.3 million tons. The decline in North America of 460,000 tons of paper and 400,000 tons of board was more than compensated by increases in Europe and Asia (respectively 1.24 and 0.52 million tons more paper and board than in 1956).

Developments in Polish Agricultural Machinery

Recent changes in the pattern of Polish agriculture are now being reflected in the production of farming machinery. In the course of the past year many large co-operative farms have been dissolved and more emphasis is now being placed on smaller-scale farming. In consequence the demand for the heavy Ursus C-45 tractor, which was suitable for very large fields, although not very economical in fuel, has dropped considerably. While 7,800 C-45 tractors were produced in 1956, only 5,922 were turned out last year, and this year's output will not be more than 3,500.

The Ursus factory in Warsaw has been quick to adapt its plans and its design department recently produced a prototype of a 25-h.p. tractor, the Ursus C-325, which weighs less than half the old model (1,360 kg. as compared with 3,300 kg.) and uses 10 kg. of fuel per ha. of ploughing (16 kg. for the C-45). The new machine has given satisfactory results in field trials and, pending a decision by the Ministry of Heavy Industry, which is expected to be favourable, the Ursus works is going ahead with the new model. It is hoped to bring out a first run of 25 C-325s before the end of the year and to start mass production with a series of 500 at the end of 1959. At the same time, in order to use the plant's capacity to the full this year, it is proposed to turn out 2,000 hydraulic hoists, 6,000 12- to 14-h.p. engines for powering threshing machines etc., and a trial run of an 8-h.p. horticultural tractor, the C-308. The latter is a versatile machine which can haul a trailer with a ton load and can be adapted for ploughing; it is hoped to produce 500 of them before the end of the year.

Hillside Tractors

Machines for Farming on Steep Slopes

W. LINNARD, M.A.

The spur of an ever-expanding world population, coupled with the steady reduction of the present cropping area due to building, is forcing men to cultivate land hitherto considered impossible to farm. Jungle clearance and desert irrigation are two ways of tackling the problem; the other is to bring steep hillsides and mountain slopes under the plough.

IN mountainous European countries, such as Austria and Switzerland, winching techniques are widespread as a means of mechanising work in small fields on steep slopes. However, winching is laborious and slow, because work is limited to the uphill haul, owing to the danger of soil erosion. In addition, a permanent or semi-permanent system of guide-blocks and deflecting pulleys is often required, as well as a flat winch site at the top of the field and a suitable anchor for the winch. Two operators are usually needed – one at the winch and the other with the implement – and work across the slope, *e.g.* contour ploughing, is impossible (see WORLD CROPS, **10,** 1958, 218).

Winching appears to be quite suitable for small plots of valuable crops, such as the steep vineyards of the Rhine valley, but for larger areas a more flexible and versatile power source is essential.

Use of tractors

The tractor is the obvious answer and the main trend of special tractor design, in Europe at least, is to keep the centre of gravity low, to enable work across steep slopes without the fear of overturning. This has proved successful up to a point and the use of cage-wheel extensions has also further improved the quality of work on slopes. However, the Austrian, Dr. Ludwig Löhr,[1,2] has conducted investigations in which it was found that the absolute maximum gradient across which a tractor with cage-wheels can work safely and efficiently, even with good soil conditions, is not more than 25%, or 1 in 4 (see Table 1).

Fig. 1. – An early model of the slope-compensating light tractor, showing the jockey wheel on the far side

TABLE 1

The three common methods of expressing gradients

Continental	*Russian*	*British*
50%	27°	1 : 2
40%	22.5°	1 : 2½
33⅓%	19°	1 : 3
25%	14°	1 : 4
20%	11°	1 : 5

Hillside tractors in Germany

For slopes, which are steeper than this, a completely new approach is needed; in fact, a completely new design of tractor. With this in mind, the research workers at the Braunschweig-Völkenrode Institute of Agricultural Engineering in Western Germany[3] designed and constructed an experimental tractor in which each pair of wheels could be adjusted from a co-axial position to a *stepped* alignment.

This novel tractor has its front and rear wheels in line. The adjustment in their alignment is made by a hydraulically - operated parallelogram device, controlled by the driver. Tests with the tractor travelling across slopes showed that this arrangement gives greater stability, less downhill ' crabbing ', less tyre deformation, and imposes an equal load on the upper and lower pairs of wheels. The driver,

Fig. 2. – An improved model of a 3-wheeled slope-compensating 16-h.p. tractor with two driven wheels, one behind the other, and the supporting wheel connected by an articulated parallelogram

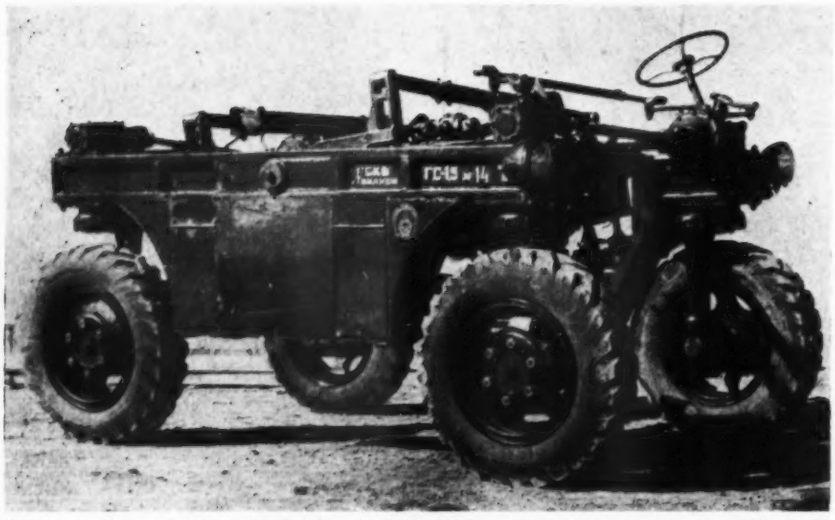


Fig. 3. – A powerful 4-wheel-drive 30-h.p. slope-compensating tractor, the SSh-24G, has a self-stabilising device

too, has a more comfortable working position.

Even on level ground the alignment has its uses: for example, when ploughing, the tractor can be kept upright, although the rear wheel down in the furrow is lower than the other. Maintaining the vertical position in this way greatly reduces driver fatigue.

Coenenberg[4] considers that the possibility of introducing this 'step' alignment in a hydrostatically-propelled tractor of a type similar to the one developed by the N.I.A.E. appears very promising. However, the immediate task the German research workers have set themselves is thoroughly to investigate suitable tyre and implement design and to discover whether mass production of such hillside tractors is economically feasible.

Hillside tractors in Russia

In Russia, work on hillside tractors has passed well beyond the experimental stage reached in Germany. Several different models have already been, or are about to be, produced in large numbers.

Work on these hillside tractors is centred at the State Agricultural Design Institute in Tiflis, the capital of Georgia, and in Kutaisi, also in Georgia. The reasons for the location of work there are the large acreage devoted to tea (a crop difficult to mechanise, normally grown on slopes, and requiring much hand labour), the mountainous terrain and the acute shortage of agricultural labour.

In view of the local conditions, the prime requirements of the tractor were: firstly, a slope-compensating system which could adjust itself automatically to work on level ground, gentle slopes and steep, often irregular slopes; and, secondly, a high ground clearance to enable it to work in terraced and unterraced hedge-planted tea gardens.

Light hill tractors

Some five different designs of slope-compensating mechanisms, including one similar to the German type, have been experimented with. One of the earliest models, the ChUG-1.6, is shown in Fig. 1, with a specially designed cultivator. It is able to work across slopes up to 30° (*i.e.* steeper than 1 : 2), as can a later model, the USG-12-A. The engineer, Sanikidze,[5] has given a very detailed description of the kinematics of this 12-h.p. model, which has two driven wheels, one directly behind the other, in a rigid frame, and a smaller supporting wheel at the side, connected to the main frame by an articulated, telescopic, parallelogram device, which is automatically operated by hydraulics. This arrangement allows the tractor to work on level ground and across any slope up to a maximum of 30° with equal facility, irregularities of gradient causing no trouble to the flexible unit.

An improved model, the SSh-16G, is also 3-wheeled and has the same slope-compensating arrangement; a few hundred models have been produced and more are planned. This model has a 16-h.p. engine, mounted on the same side as the driven wheels, where the driver sits. The gearbox provides for six forward and two reverse speeds, the forward speed range being 0.6 to 9 m.p.h., and the

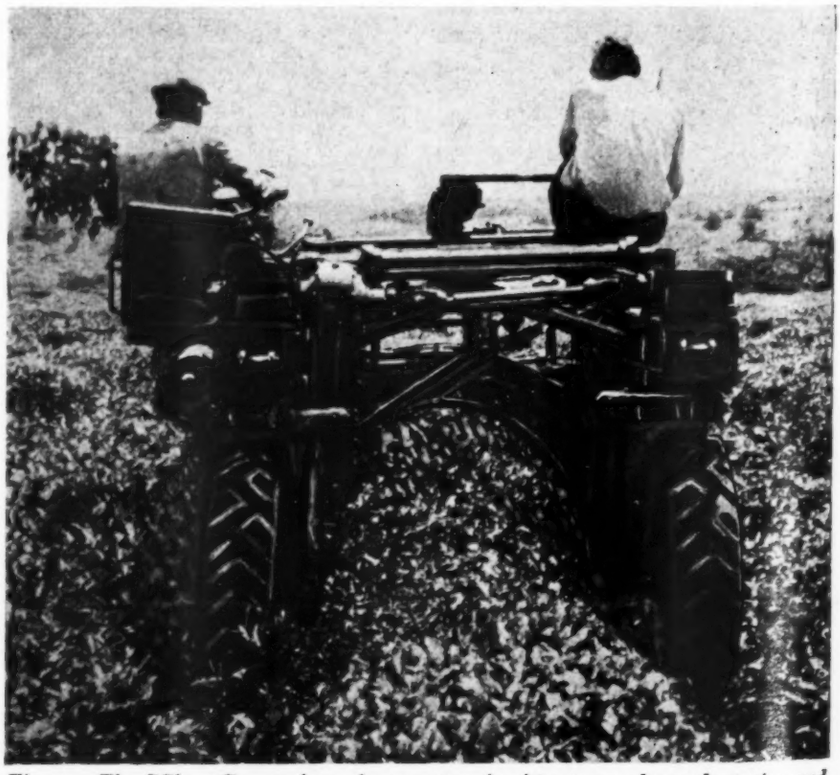


Fig. 4. – The SSh-24G, seen from the rear, pruning in a terraced tea plantation and straddling a line of hedge-planted bushes

rated drawbar pull is 1,100 lb. Because of the telescopic parallelogram, the track width can be altered from 4½ to 7 ft.; another outstanding advantage of the new portal-type design is the very high ground clearance of nearly 4 ft. The tractor has the usual hydraulic lift system and a wide range of implements has already been specially designed for it. Fig. 2 shows the tractor working on a 22° slope.

Heavy hill tractors

Despite the success of the SSh-16G, it is obvious that a 16-h.p. tractor is not powerful enough for all the jobs on a hill farm. Therefore, Kereselidze[6] and other research engineers in Tiflis and Kutaisi continued to experiment and finally produced a more powerful 30-h.p., 4-wheel-drive tractor, the SSh-24G on the base of the GS-1.5. This machine, shown in Fig. 3, also has a self-stabilising device to counter completely the effects of side slopes up to 30°. It works on the same principle, but is more complex than that of the 3-wheeled model, as can be seen in the illustration. In 1957, 200 models were manufactured in Tiflis, and 300 more are planned for 1958.

This tractor, with three p.t.-o.s, is the answer to the hill farmers' urgent need for a medium-powered machine which will enable full mechanisation of the work in tea plantations, fields of sunflowers, lavender, forest nurseries etc. Its high ground clearance of 4½ ft., its drawbar pull of about 3,700 lb., and the adjustable track width (maximum 7 ft. 4 in.) obviously make it particularly suitable for work in other tall crops, such as maize, and in row crops, grain and forage crops grown on slopes. The tractor can also be used on level ground in exactly the same way as a conventional machine.

Mechanisation of tea

Fig. 4 shows the machine at work pruning in a terraced tea plantation, straddling a line of hedge-planted bushes. Equipment for fumigation, pruning and plucking has been developed especially for tea, while other implements, such as special ploughs, harrows, subsoilers and liquid fertiliser distributors have also been produced for this tractor for general use.

Summing up

These 3- and 4-wheeled models will play an important role in bringing the potential agricultural lands of Soviet Russia under the plough. The main areas where the hillside tractors will be most useful are the Urals, Caucasus and the Altai Mountains of Central Asia. Their sheer versatility, based upon wide track width, high ground clearance and their ability to negotiate side slopes with ease, will ensure their popularity. Quite apart from the better quality of work which they can perform on slopes, the advantages to the driver are also considerable: less fatigue, increased safety and improved vision of the implements.

New vistas are thus being opened to agriculture. It is probably not overstating the point to say that, with the help of these hillside tractors and the improved models which will follow, we will see valuable crops growing on slopes previously considered fit only for grazing by mountain sheep or goats.

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Air Pollution

Plant damage from smog is caused by an oxidising agent, according to Hugh T. Freebairn, a biologist at the University of California, and he has found that the injurious smog components can be removed from polluted air by using such metals as steel, magnesium and zinc as filters. The newsletter of the Armour Research Foundation of Illinois Institute of Technology, Chicago, reports also that Californian scientists have discovered that the complete combustion of refuse by incineration produces an irritating air pollutant, formaldehyde. The solution found by the research workers is to allow only just enough air into the incinerator for complete combustion. An excess of air added to eliminate smoke simply replaces the smoke with the invisible formaldehyde.

Moisture Content of Copra

Toplis-Simpson electric meters are being used in Fiji for the determination of moisture in bulk samples of copra, according to a report in the *Agricultural Journal of Fiji*, **27**, 1956, 96. To obtain reliable values a calibration curve produced from copra samples of known moisture content is required for each meter. An accuracy of + or − 10% is obtainable if eight sacks in each consignment are sampled.

Agricultural Expansion in Israel

It is planned to increase agricultural production in Israel by 63% in the next few years and in doing this to absorb an additional 10,000 families into agriculture. The policy is to increase exports and reduce imports.

Irrigation schemes will play a large part in this expansion. Water consumption for irrigation is expected to increase by 350 million cu. m., or 50%, in the next three or four years and the areas under irrigation are to reach 1,700,000 dunams.* The main parts to benefit will be the south and the Negev, where the irrigated areas will be expanded from 360,000 to 720,000 dunams.

Of the 700,000 dunams to be put under irrigation in the near future, 200,000 dunams will be devoted to citrus, while the area under cotton and groundnuts will be increased threefold to 300,000 dunams. 70,000 dunams will be sown with sugar-beet and about 400,000 dunams will be put under summer and winter seed crops.

Citrus fruits are Israel's most profitable crop. The 1956–57 season has been very successful, with demand, at times, even exceeding supply, but this was partly because competition from Spanish fruit was very limited owing to extensive frost damage in Spain earlier in the year.

An ambitious citrus planting programme is now in progress. All citrus varieties are being planted, but special emphasis is being placed on the planting of grapefruit in view of increased demand by the European market. Prospects for the coming season are good.

* 1 dunam = ¼ acre

The Menace of Smog

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In addition to the loss of human and animal lives, smog causes extensive damage to plant life. With the increasing industrialisation of the Los Angeles Basin, air pollution is increasing and causing serious damage to lawns, flowering plants, arable and horticultural crops.

Smog damage
The light patches show where the plant cells have been affected. Lesser degrees of smog will stunt its growth; more may destroy the plant

SMOG is a word popularly used to describe a form of air pollution. It is not a new phenomenon, but the menace of smog is increasing with increasing industrialisation, and it is now estimated to be responsible for many millions of dollars worth of damage in the U.S.A.

According to Dr. J. T. Middleton, plant pathologist of the University of California, the loss in that state alone amounts to $3 million per year and the situation has been steadily worsening since 1953. ' Air-borne toxicants ', he states, ' are causing serious damage not only to flowers, lawns and shrubs, but also to important crops, such as grapes, leaf vegetables and citrus '.

The loss of life directly attributable to smog is considerable, but the extensive damage done to vegetation is not so easily appreciated. Yet visible damage can be done to plants at a level of contamination which a human being would scarcely notice.

According to research carried out at the University of California, smog reduces the chlorophyll content of the leaves of plants, so causing a slowing down of its photosynthetic activity, and this effect becomes progressively worse with the period of exposure. Thus, four hours' exposure caused a 10% reduction in activity, while 24 hours resulted in a 67% reduction in photosynthetic activity. Another important effect is that the gases in smog break down the cell membranes and kill the protoplasm within.

It is generally agreed that smog is caused by the incomplete combustion of hydrocarbons – the natural gas used to produce heat and electricity; the coal, used as an industrial fuel; and the petrol and diesel fuel, used in motor cars, trucks, buses, aeroplanes and locomotives. It is considered, however, that in Los Angeles the greatest source of smog is the motor car exhaust.

It has been estimated that no less than 3,000 tons of waste products are daily poured into the air as exhaust gases from the cars, lorries and buses of Los Angeles, and Mr. W. T. Noble, the chief plant specialist of the Los Angeles Pollution Centre, is of the opinion that if the 2½ million vehicles in that county had effective exhaust controls the damage to agriculture could be cut by two-thirds.

The problem is, of course, nation-wide in its implications and the U.S. Government has established a centre for research on smog at the Taft Engineering Centre at Cincinatti, Ohio, and millions of dollars are being spent by industrial concerns to prevent the contamination of the air through the fumes and dusts from their manufacturing processes.

Los Angeles Civic Centre on a day when a low-temperature inversion and weak winds have allowed a concentration of atmospheric pollution, otherwise known as 'smog'

Seychelles Vanilla—II

Curing and Marketing the Crop

J. F. G. LIONNET
(*Department of Agriculture, Seychelles*)

The special flavour of the natural product, which makes it superior to the synthetic, is produced in the pods by subjecting them to a curing process, involving fermentation, which is described below. In Part I the author gave an account of the propagation and the culture of the plant.

The curing of Seychelles vanilla. The hessian covering of the racks in the foreground has been removed to show the pods

IT was stated in Part I that among the factors responsible for the quality of the flavour of the cured pods the degree of insolation of the vines is important. The most important factors, however, are the stage at which the pods are picked and the efficiency of the curing process.

Crop collection

Although the pods reach their greatest size four to six weeks after pollination, it is eight to nine months before they are ripe for picking. It is essential to pick the pods at just the right stage, as immature pods will produce an inferior product, with less vanillin and poor flavour, and they are liable to decomposition, while pods picked too late will split during curing and result also in a lower-priced product.

The characters that guide the pickers are the following: the maximum growth of the pods is indicated by their colour, which merges into that of the vine; the right picking stage is when the free end of the pod starts to turn yellow while the rest of the fruit turns from a brilliant to a lighter and duller green; fine yellow streaks appear on the pods and the lines of dehiscence also turn yellow.

The plantations are visited every day so that the pods can be picked as soon as they are ready. They are picked by a twisting motion of the hand and, as they are usually picked in the morning, curing starts in the afternoon of the same day, or at the latest the next day, to avoid splitting.

In the Seychelles and in some other producing countries it is the custom to prick distinguishing marks on the green pods to ensure against thefts. These small marks can be seen on the cured pods and are sometimes mistaken by purchasers for insect damage.

The process of curing

The curing of vanilla pods has been defined as their controlled ripening. It is an extremely important stage in production, as it is during curing that they undergo the enzymatic reactions responsible for the characteristic flavour of vanilla. There are many methods of curing, but they all consist more or less of three stages: the *killing* stage, when the vegetation of the pods is stopped by heat or other treatments; the *fermenting* stage, when the pods are kept under certain conditions of moisture and temperature to allow for the enzymatic processes to take place; and, finally, the *drying* stage, during which the pods are slowly dehydrated. Stages 2 and 3 tend to merge into each other, as dehydration starts during the fermenting stage and fermentation proceeds while the pods are drying. The full flavour of the cured pods is obtained only towards the end of the curing process. The curing method followed in the Seychelles comes from Réunion.

The killing stage

The green pods are either dipped in hot water for a few seconds or they are enclosed in an atmosphere of hot water vapour for some 12 hours. This is to stop the vegetation of the pods or *kill* them.

Although the hot water vapour treatment is safer and produces a more uniform produce, the hot water dip is sometimes resorted to, as it is quicker and is useful when there is a large crop. It needs an expert hand, as the pods should be dipped for only a few seconds at a time, the operator determining from the appearance of the pods when the treatment is complete.

This hot water treatment is carried out with very primitive equipment. About a hundred pods at a time are placed in an open-work basket and dipped into a container of hot water at

The sorting and grading of vanilla

85°–90°C for 10 sec., removed for 5 sec. and dipped again for about 12 sec. As the temperature of the water falls, the dipping time of successive lots of pods has to be increased and, as may be expected, accurate treatment is not always given.

For the hot water vapour treatment a 50-gal. wooden cask is generally used. The pods, 3,000 at a time – with the larger at the bottom and the smaller ones on top – are placed on a wire-netting grid situated 12 in. from the bottom of the cask. The latter is closed by means of a wooden lid and boiling water is poured into the bottom part of the cask to a level of 4 in. below the grid. Some 8 gal. of boiling water are needed to treat 3,000 pods. The pods are left in contact with the hot water vapour for 12 hours. By this method one man can deal with 10,000 pods in an afternoon.

The fermenting stage

The second stage is carried out in woollen or sacking blankets, in which the pods are either wrapped or covered immediately after the first stage. The object of wrapping or covering is to conserve the heat and the moisture, which are essential for the fermentation processes.

In the hot water treatment the pods are wrapped, while still hot and moist, in the blankets and are allowed to sweat during the night. The next day they are wiped again, laid in wooden trays between the blankets and exposed to the sun for two or three hours. During the rest of the day they are stored, still covered, inside a building. This procedure is repeated for five or six days.

In the hot water vapour treatment the pods, after removal from the cask in which they have already undergone partial fermentation, are at once placed on wooden trays between blankets and exposed to the sun for two or three hours. This procedure also is repeated for several days. A few hours after killing, the pods turn the characteristic chocolate brown colour which is indicative of successful treatment. After a week the pods start to lose their turgidity and become wrinkled.

During the fermenting stage the pods require the utmost attention, as they are more liable then than at any other time to get mouldy and lose quality. Any mouldy pods found at any time during curing must be removed and treated separately.

The drying stage

The third stage, during which the pods are slowly dehydrated, is carried out in a well-ventilated room, where the pods are exposed on wooden trays for about 30 days. Even then constant attention must be paid to the pods, the mouldy ones being removed from the main batch as soon as detected. After drying for a month the pods, which have now acquired a fine deep chocolate brown colour, are removed to well-closed containers, such as tin trunks with a paper lining, and are allowed to mature for one more month, during which they are regularly examined every three or four days. Any mould which may develop during this last month is less dangerous than earlier in the process and may be removed by wiping with a cloth soaked in 70% alcohol; the pod may then be replaced.

Sorting and grading

Curing is followed by conditioning, during which the pods are sorted out into lengths and graded for quality, and finally they are bundled.

The following grades exist in the Seychelles: a *first grade*, which consists of properly cured pods, 4 to 9 in. in length, of good appearance and consistence, with a good flavour and with no blemishes whatsoever; a *second grade*, consisting of pods which are called ' boisées ', whose colour is not good because of reddish streaks that make them look like wood (hence the name), and which are mainly pods picked at an immature stage; a *third grade*, sometimes called ' Pêle mêle ' or ' inferior vanilla ', which contains all the pods, except the split ones, which do not fall within the two higher grades. Split pods are a class apart – they may be of quality comparable to the first or second grades, but they do not fetch the same prices because of their appearance. The bundling done by producers is only a rough one, the pods of different qualities being sorted out by length and made into bundles of approximately 1 lb., which are then tied. About 70% of the crop in the Seychelles is of the first grade.

Vanilla is sold by the growers either green or cured. The buyers of green vanilla, who are usually also exporters, either cure it themselves or hire a curer; some growers also hire well-known curers, or ' préparateurs ' as they are better known. The exporters make a thorough examination of the

Bundles of Seychelles vanilla, as exported

cured pods and re-sort them if necessary. The pods are usually kept under observation for a month before they are re-bundled and exported. In re-bundling care is taken to obtain a neat and attractive appearance by placing the better-looking pods on the outside, the bundles being tied at the middle with cotton thread.

If kept for some time vanilla 'crystallises'. Fine white crystals of vanillin appear on the surface of the pods, especially towards the free-end, which is richer in vanillin. Such frosted vanilla, described as 'givrée', is more attractive than ordinary vanilla and may command better prices. Three kinds of 'givrée' are recognised, depending on the shape and type of the crystals, two of which are considered to be indicative of good quality. Some vanillas, however, do not crystallise, such as the Mexican, which is, nevertheless, the finest vanilla that exists. Meyer[1] states that no vanillin crystallises in the country of origin, where the climate is too hot and too moist for the 'givrage' to take place. This is not correct, as vanilla has been known to crystallise in the Seychelles and also in other producing countries.

Production and marketing

Frère[2] states that Seychelles vanilla, cured and conditioned as in Réunion, is as well thought of as the Bourbon and Comoros vanillas, whose quality it resembles. Vanilla classed as Bourbon, which is produced in Réunion, Madagascar and the Comoros, is of very fine quality, being of only slightly less value than the highly-esteemed Mexican vanilla. Seychelles vanilla intended for the U.S.A. is drier than the produce exported to the U.K. and other countries, the U.S. market preferring a quality with a higher content of vanillin for preparing extracts. This drier vanilla is particularly resistant to wastage in transit.

Although consignments of Seychelles vanilla vary in size and type of packing, some have recently been of 17 lb., made up of tins, lined with grease-proof paper, containing bundles of about ¾ to 1 lb.

Formerly Seychelles vanilla was mostly exported to the U.K., France and Germany. Recent buyers have been the U.S.A., the U.K., Canada and South Africa. In the importing countries Seychelles vanilla is usually sold (usually by auction in the U.K.) on its appearance after the produce has been examined by prospective buyers.

Yields

It is difficult to assess the average yield per acre of Seychelles vanilla plantations because of the haphazard spacing on the hillsides and the irregular production due to varying climatic conditions. In a good year an acre of line-planted vanilla, such as are found on the coastal flats, will produce 100 lb. or more of cured vanilla. In a bad year this figure can be as low as 10 lb. or even less. Following extremely good conditions at flowering time, bumper crops, showing a yield of 200 to 300 lb. per acre, can be obtained. As it takes a thousand green pods to make 6 lb. of cured vanilla, this means a crop of up to 50,000 pods per acre.

Compared with the 800-ton production of the French Union (including 400 tons from Madagascar alone), the present Seychelles production of up to six tons of vanilla pods a year is insignificant, but for the tiny islands of Praslin and La Digue (seldom even marked on world maps), where the bulk of the Seychelles crop is grown and cured, it is a major source of income at present prices. Many families have been growing vanilla for 70 years or more on these islands and have developed methods of producing and curing the fruits of what might be described as the only *useful* orchid to the stage where it is difficult to say whether they are practising a craft or an art.

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Spraying Hazards

Spray Drift

At the last meeting of the British Weed Control Council information on the aerial application of hormone weedkillers, such as 2,4-D and MCPA, came under discussion. It has been known for some time that the spraying of hormone weedkillers from ground-crop spraying machines, valuable as the technique is on agricultural crops, can constitute a hazard when sprayed near susceptible crops, such as tomatoes, cruciferous crops (turnip, swede, cabbage, cauliflower, kale, brussels sprouts etc.), beet, orchard trees at flowering time (especially pears), lettuce and glasshouse crops because of the danger of drift; for example, tainting of tomatoes with MCPA and malformation of lettuce with MCPA or 2,4-D. This hazard is greatest when low-volume spraying is practised. The dangers of applying these chemicals from aircraft, and particularly fixed-wing aircraft using atomisers, are immensely greater, for in the small fields of this country it is practically impossible to ensure that all the spray reaches the target area. The Council feels strongly that it should be widely known that aircraft spraying of hormone weedkillers near such susceptible crops is a dangerous practice and one that should be avoided.

Arsenic Residues

Sodium arsenite is an efficient weed-killer and is recommended for weed control in bulbs and for potato haulm destruction, but, because of its highly poisonous nature, it should under no circumstances be used in other crops. It is known, for instance, that where sodium arsenite has been used for the control of weeds in other crops, such as kale, arsenic residues that may be left on and in such crops are dangerous.

Crop Damage

An account of the work being done by chemists and biologists of the Plant Protective Chemistry Section of the East Malling Research Station was given recently to members. The programme consisted of an account of investigations on the nature and mechanism of spray damage arising from the use of copper sulphate. Mr. F. W. M. Llewelyn showed how the sensitivity of leaves to spray damage varied according to the time of year and the variety, and Mr. M. Allen continued with an account of how copper gets into the leaf and demonstrated how the amount of copper in sprayed leaves could, under certain conditions, be high enough to cause damage.

The Budapest Fair

Gigantic Combine Harvesters are Outstanding

DIP.ING.L. HORVATH
(Our Special Correspondent)

The world-famous Budapest Fair was started in 1829 by Count Szechenyi as a livestock show. It has gradually expanded in size and scope, until today the Hungarian Agricultural Show is an international exposition covering all aspects of agriculture.

THE Hungarian Agricultural Show is fortunate in having a permanent showground of 80 acres, with permanent exhibition halls, stables and kennels, and a magnificent arena in which to stage the International Horse Show, together with the usual temporary buildings and tents.

The show this year attracted over 1½ million visitors and included an exhibition of agricultural methods, agricultural machinery and scientific equipment, a horse show and tournament, a wine contest and a dog show. The agricultural exhibits covered cereals, fodder and feeding stuffs, vegetables, fruits, forestry products, cattle, horses, sheep, pigs, poultry, fish, dogs, and, of course, the wines, for which Hungary is famous. (Who has not heard of rich Tokay?) There was a Congress of Agricultural Engineers and a Convention of Farmworkers and Co-operatives during the show.

The Department of Plant Industries staged a demonstration of plant breeding and seed production, modern agricultural methods, plant protection, irrigation and drainage.

General view of the Budapest Fair

There were no less than 250 foreign and 300 Hungarian wines entered in the International Wine Contest, exhibits being received from Australia, Austria, Albania, Bulgaria, Cyprus, Czechoslovakia, France, Italy, Russia and Spain.

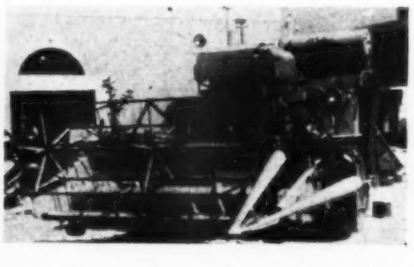
The Trade Show

There were 670 machines on view, 385 of which were manufactured in Hungary. There were the latest Massey-Ferguson and David Brown tractors from Britain, the East German 'Maulwurf', the Hungarian 'Universal' tractor and the Russian type SzS-24G hillside tractor. The last has a 30-h.p., 6-cylinder engine, with six forward and two reverse gears, and can operate at speeds ranging from 0.5 to 11.3 m.p.h. There are two hydraulically-operated implement bars, one forward and one in the rear, but the special feature was the two hydraulically-adjustable side frames to support the machine and keep it vertical on a sloping hillside.

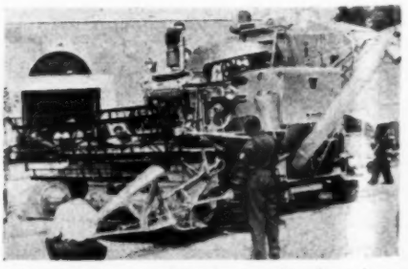
Combine harvesters

Perhaps the most remarkable exhibits of the show were the gigantic harvester-threshers. Two Hungarian machines were shown – one of these, the 'Velence', a 50-h.p. model, has four gears, a hydraulically-governed variator, and a hydraulically-controlled

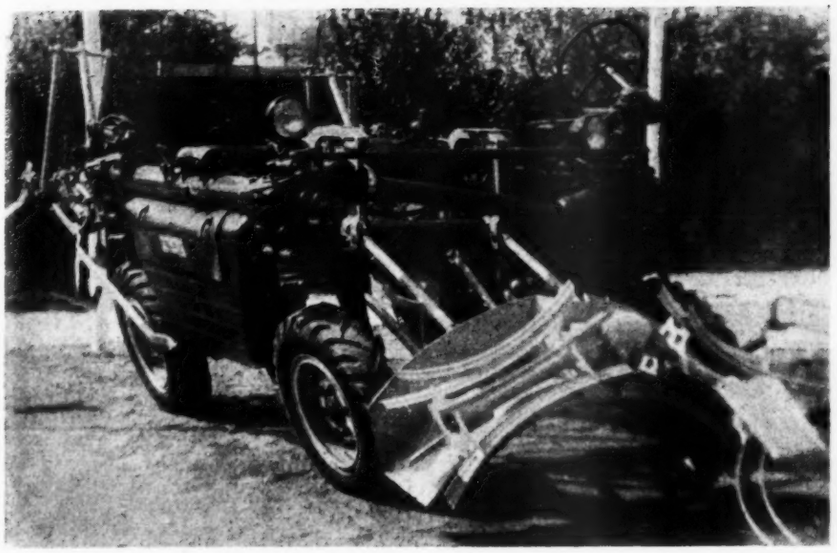
The TLZ4 flax-pulling machine from Czechoslovakia



The 'Velence' harvester thresher from Hungary



The ZSM-330 harvester thresher from Czechoslovakia



Above:
The SZS-24 G hillside tractor from Russia

cutter bar about 11 ft. in width. The grain is discharged into an accompanying truck and the straw is baled and dropped.

Czechoslovakia was showing its type ZSM-330 model, which has a 60-h.p. Tatra engine, and four forward and a reverse gear, the first gear being variable. The cutter bar, which is also 11 ft. in width, follows the contour of the ground and the speed of the collecting reel is controlled by the speed of the tractor. There is an ingenious hydraulic-electric device for ensuring a close cut, as the straw is often required as fodder.

Russia showed its 1958 model, the CK-3, which has a 13-ft. cutter bar and two separate hydraulic systems – one for the steering and the other to control the height of the cutting table, the speed of the reel and the variator. There is a warning device on the instrument panel, which indicates by means of a system of lights whether clogging is occurring anywhere in the system.

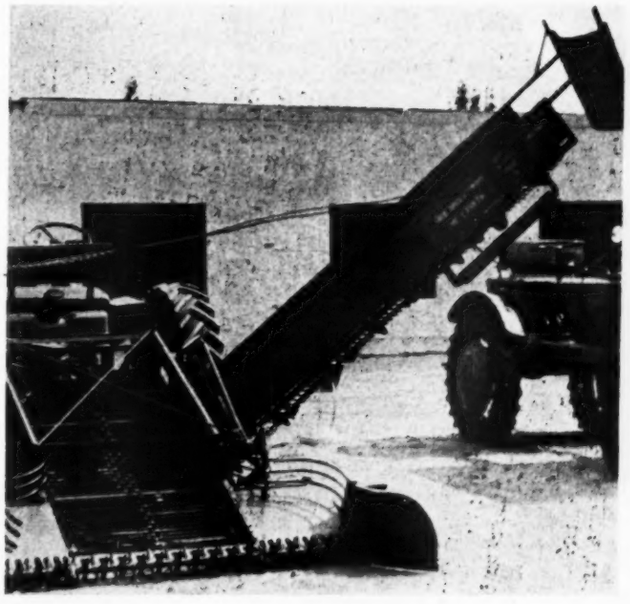
Sugar-beet harvesters

The East German machines were outstanding. The type E-710 beet topper and harvester deals with six rows simultaneously, three rows being topped, while three are being lifted. The roots and leaves are separately discharged on to the ground and are collected later by the model T-271 beet pick-up and the T-273 leaf pick-up, both of which deliver the material into accompanying trucks.

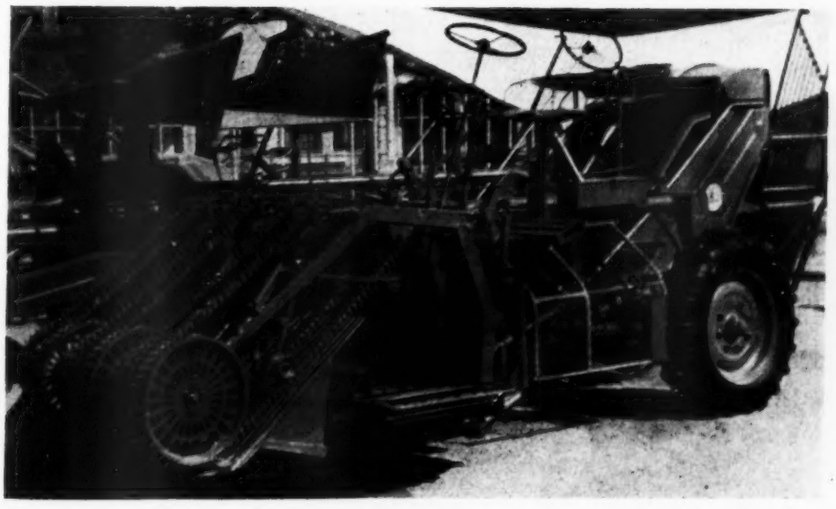
Flax harvesting

Czechoslovakia showed implements for the harvesting of flax. The type TLZ-4 flax puller produces a 5-ft. cut and has an operating speed of 2 acres per hour. The machine is tractor drawn and operated from the p.t.-o. The flax is extracted in a clean condition by a system of rubber belts and is discharged as a continuous swathe to be picked up later – one row at a time – by a type OLZ swathe turner, which is horse drawn.

Right:
The CNT-2,1 sugar-beet harvester from Russia



Below:
The E-710 sugar-beet harvester from East Germany



The Massey-Ferguson tractor and potato planter from U.K.

Self-Help in China

The Improvement and Invention of Small Farm Implements

HSIEH YING-CHI

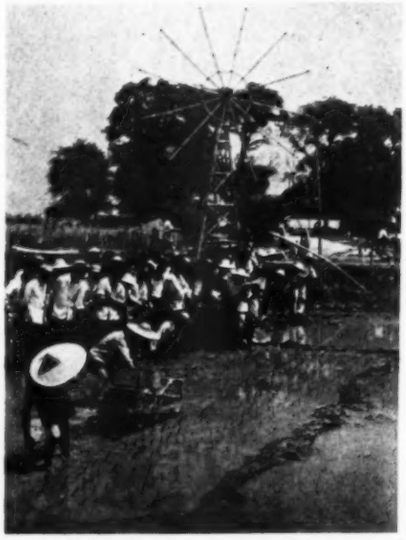
After decades of civil wars and banditry, and the long-protracted war against Japan, a new China is being born out of a desperate struggle for survival, with only limited economic resources and little technical education, by the 600 millions of the biggest nation on earth. In a previous issue – WORLD CROPS, 1958, **10**, 223 – *an account was given of plans for greater agricultural production; here, surprisingly, we are told of a labour shortage and of the national campaign to achieve the targets set for grain, cotton and other agricultural products in spite of the manpower position.*

FOLLOWING the big increase in agricultural production in China in 1957, a campaign to improve farm implements and machinery was launched, because, in order to meet the needs of the people, the targets of production had to be set higher. It was not possible to achieve these targets with primitive farm implements and hand labour alone, and without the greater use of fertilisers and the provision of more water for irrigation.

There has also arisen an unexpected shortage of manpower to achieve the targets set by the planners. In Hunan province alone it has been calculated that it needed 4,400 million workdays to meet the requirements of China's Second Five-Year Plan; with 12 million farm workers it would require, with the antiquated methods and tools they were then using, 360 workdays from each of them during the six months ending June 1958—obviously an impossibility.

A Mass Movement

So arose a mass movement for the better organisation of farming operations and for the improvement of farm machinery and equipment on an unprecedented scale. With considerable ingenuity and intelligence the people as a whole vigorously attacked the problem of improving their farm tools. Starting with the equipment used for irrigation and drainage, they next improved their means of transportation, they evolved devices for the protection of their crops, and they invented machines and implements for the cultivation of crops and the processing of agricultural produce, and also power machines for forestry operations. In all, a total of more than 67 million



The ' Yiken ' rice transplanter, invented by peasants in Kwangsi province

items of new or improved tools and machines have thus been produced.

These new machines are man-, animal-, water-, wind- and machine-driven; they are simple, light and easy to handle and are mostly made in the rural areas with locally available materials. Thus a foot-operated tamping machine, invented for the building of the Puhsiang reservoir in Yunnan, now requires only one man to do the work of four and the machine costs only Y12.† A 3-wheeled ox-cart, made by the Fanchung Co-operative Society in Anhwei, is now used for the transportation of earth over great distances; only one man and an ox are now needed to do the work of five or six human beasts of burden. An overhead conveyor across a valley has been devised by a member of the Hsinchieh Co-operative Society in Hunan for transporting soil or fertiliser in hilly regions, so raising human efficiency 15 times at little expense and also reducing the heavy burden of human toil.

Irrigation

A sprinkler irrigation system has been devised by a worker in a farm implement factory in Kansu province; besides using only half the water used in ordinary ditch irrigation, this apparatus will raise water to a height of 65 ft. and will irrigate about 40 mou‡ of land in a day; it is particularly suitable for hilly regions, as there is less movement of soil with man-made rain.

A treadle-operated water-wheel has been made from scrap materials, costing only about Y10–15. It is two or three times more efficient than a primitive water-wheel costing five times as much, and it can irrigate 10 mou of land in a day.

Planting and cultivation

A rice-planting machine which was invented in Kwangsi automatically

A demonstration of the treadle-operated water-wheels invented by the peasants of Hopei province

picks up and then transplants rice seedlings at the rate of one mou per hour, which is 12 times as fast as the usual method of transplanting by hand. In Kwangtung, they have designed a special boat for transplanting rice, which makes it possible for the men to do their work sitting instead of bending, thus improving their working efficiency by 30%; these boats can also be used for spreading fertiliser over the paddy fields.

A double-row cotton planter worked by one man and a draught animal is able to sow 25 to 30 mou per day and is in use in Shensi province. It is light and easy to manoeuvre and costs only about Y16. It can not only sow grain and cotton, but it is also useful for after-cultivation. A 2-furrow, 2-deck (reversible?) plough, invented by a member of a co-operative in Honan province, can plough 3 to 3.5 mou of land to a depth of 1.2 to 1.5 ft. in a day, thereby increasing productive efficiency four times.

Exhibition of tractors made in China

Power and traction

Well over a hundred types of tractors have been built, and power-driven pumps designed for irrigation and drainage. Hopei province has established a power station which utilises small differences in water level on the plains, and in Hupei and Kwangtung provinces they are producing methane gas by a fermentation process and this is used for generating electricity and for providing power and light.

Grain and flour milling

In Honan province they have converted an old horse-drawn millstone for grinding flour into a watermill using the frame of a 'Liberation' type of water-wheel. Production has now increased 10 times, or 20 times more than that of man-powered rice mills, and in times of drought the water-wheel can be detached and used for irrigation.

In Hupei province there is a mill for the continuous processing of grain with eight production lines, consisting of a stone roller, pestle, millstone and sieves and powered by a watermill, for milling rice and other cereals. This installation does the work of 4,000 men and 3,000 animals.

A hand-operated harvester which was invented by people in Shansi province

A national campaign

These are a few of the thousands of inventions, improvements and improvisations made in the national campaign to produce simple machines to replace manual labour, to lessen physical fatigue and solve the immediate urgent problem of the shortage of manpower. The inventors are just ordinary peasants and craftsmen, neither specialists nor men with either special training or education. Yet among these small machines one is pre-eminent – the rice-transplanting machine, invented by Chen Yen-tsing, which has solved the problem of feeding in, separating and planting young rice seedlings. It is a simple inexpensive machine, which is superior to anything yet produced in any other rice-producing country.

The present campaign represents only the beginning of the reform of the

. Contributed by the Britain-China Friendship Association. See also WORLD CROPS, **9**, 90 and 360; **10**, 119, 123 and 314.

† Y (Yuen) 7 = £1 sterling.

‡ mou = ⅙ acre.

§ 1 catty = 1⅓ lb.; 1,000 catties per mou = 8,000 lb./acre.

Chinese agricultural economy. The first result has been to increase agricultural production and the 1958 targets have been realised. In Hupeh province, they have gone even further and have revised their targets of production upwards – for rice, from 600 to 1,000 catties§ per mou, and for cotton, from 60 to 100 catties per mou of land.

The next stage

The small farm implements and machines which have been invented or improved are primarily designed to meet the immediate requirements of the farmers. In a short space of time, and with the increasing income, it is anticipated that all the antiquated and primitive tools will have been replaced and it will then be possible to introduce more generally the bigger and more powerful machines, now being produced in the factories of China, and then by the correct integration of full mechanisation, partial mechanisation and essentially manual operations to reach the objective of modern agriculture and rural electrification, and thus parallel the technical achievements of other parts of the world.

Coming Events

Corrosion. – The largest display of anti-corrosion methods ever held in Britain will be staged in London from 27–30 April this year. The First Corrosion Exhibition, held in October 1957, attracted 8,000 visitors and the organisers – the technical journal, *Corrosion Technology* – have planned a bigger and even better show for 1959.

The Royal Horticultural Society's New Hall in Westminster will house 69 exhibitors, who will show and demonstrate what is new in the battle against corrosion, the menace which presents Britain with a £600 million bill each year. The range of anti-corrosion products shown will include: Anti-corrosion fluids, cathodic protection, cements, coatings and linings, conduits, corrosion prevention tapes, corrosion-resistant metals, de-rusting tools, epoxy resins, finishing processes, fuel additives, galvanising, industrial glassware, industrial porcelain, metal finishing, metal spraying, non-ferrous metals, paints, painting contractors, plastics, rubbers, valves, water treatment, wrappings, zinc products.

Enquiries about the Corrosion Exhibition should be sent to the Exhibition Organiser, *Corrosion Technology*, Leonard Hill House, Eden Street, London, N.W.1.

Small Engines. – To mark their sixtieth anniversary the Villiers Engineering Co. Ltd. are holding an exhibition of Villiers- and JAP-engined machines and equipment at the Royal Horticultural Society's New Hall, Greycoat Street, Westminster, London, S.W.1, on 7, 8 and 9 January. Nearly 300 British manufacturers who use Villiers Group engines are contributing a total of more than 350 exhibits with more than 100 different applications.

Food Supplies. – A course of 10 evening lectures on 'Britain's Food Supplies' has been arranged by the Department of Extra-Mural Studies of the University of London and the Association of Agriculture. The lectures will be held at the British Institute of Recorded Sound, 38 Russell Square, London, W.C.1, and the programme will be:

14 January – 'Food and Farming: Britain's Position in the World Today – An Introduction' – Alexander Hay, N.D.A., N.D.D., M.I.B.A.E., General Secretary, Association of Agriculture.

21 January – 'A Comparative Study of Crop Production in Great Britain' – Sir James Scott Watson, C.B.E., M.C., LL.D., D.SC., lately Chief Scientific and Agricultural Adviser, Ministry of Agriculture, and Director-General of the National Agricultural Advisory Service.

28 January – 'A Comparative Study of the British Livestock Industry' – Professor W. Holmes, B.SC., PH.D., N.D.A., Head of the Department of Agriculture, Wye College, University of London.

4 February – 'Types of Farming and Food Production in England and Wales' – J. W. Birch, B.A., PH.D., Department of Geography, University of Bristol.

11 February – 'Types of Farming and Food Production in Scotland' – D. J. Sinclair, M.A., Department of Geography, London School of Economics.

18 February – 'Danish and European Farming and Our Food Imports' – J. H. Bird, B.A., PH.D., Department of Geography, King's College, University of London.

25 February – 'Types of Farming and Food Production in Canada' – Miss J. H. D. Bostock, A.I.B.A.E., Editor, Farm Study Scheme, Association of Agriculture.

4 March – 'Types of Farming and Food Production in Australia' – J. S. Duncan, M.A., Department of Geography, University of Manchester.

11 March – 'Types of Farming and Food Production in New Zealand' – Professor R. O. Buchanan, M.A., B.SC., PH.D., Head of the Department of Geography, London School of Economics.

18 March – 'Tropical Agriculture in Relation to Our Food Requirements' – G. W. Nye, C.M.G., O.B.E., B.SC., Agricultural Adviser to the Secretary of State for the Colonies.

Applications for admission to the course and requests for further information should be addressed to: The General Secretary, The Association of Agriculture, 53 Victoria Street, London, S.W.1.

Farm equipment. – The Farm and Industrial Equipment Trade Show takes place from 28–31 January in Toronto. Information from Canada Farm and Industrial Equipment Trade Show Ltd., 40 Wellesley Street East, Toronto 5, Ontario.

Agriculture. – The 'Grüne Woche 1959' will be held in Berlin from 30 January to 8 February; it attempts to re-create an understanding between town and country, with the emphasis on technical development in both fields. Features will include Import and Export Show, animal shows, forestry, fruit and vegetables, seeds, pest control, agricultural machinery, land technique and technical supplies. Exhibition tickets are obtainable from M. Neven du Mont, 123 Pall Mall, London, S.W.1. Other enquiries to the Berliner Ausstellungen, Eigenbetrieb von Berlin, Berlin-Charlottenburg 9, Masurenallee 5-15, Germany.

Agricultural machinery. – The 30th Salon Internationale de la Machine Agricole will take place from 3–8 March at the Exhibition Ground of 'La Porte de Versailles' in Paris. Information from L'Union des Exposants de Machines et D'Outillage Agricoles, 95 Rue Saint-Lazare.

Weed Control in the Tropics

(Continued)

Selective Weed Control in Sorghum (Dura) *by R. K. Pfeiffer and R. Burleigh (Chesterford Park Research Station, England)*

Previous work in the Sudan has shown the value of 2,4–D and MCPA for the selective control of the semi-parasite *Striga hermonthica* 'Arabic Buda' in sorghum. This weed can depress the yield up to 80% and more.

The present results show the value of general weed control on irrigated sorghum and on rain-grown sorghum in the Sudan. If the weed population is moderate to heavy, a large yield increase can be expected from an application of ½–1 lb. 2,4–D or MCPA. If the spraying is not done before three weeks have passed after sowing, crop damage is negligible and several times compensated by the yield increase.

The effect of weed control persists from five to six weeks and enables the crop to become well established. Weed regrowth after this period seems to have no effect on the yield. Most weed control spraying on sorghum has to be done approximately a week to ten days before cotton is planted: thus little contamination of cotton plants by spray drift is likely to occur.

The understanding of the weed control problems of tropical Africa requires some knowledge of the weed ecology of the various climatic zones and the responses of the economic crops to treatment with the various chemical weed-killers now available. The first part of this account of the proceedings of the Second African Weed Control Conference appeared in World Crops, 1958, 10, 417.

Studies on the Weed Population of the Sudan Gezira Scheme *by K. Wilson-Jones (Colonial Pesticides Research Unit and formerly Ministry of Agriculture, Sudan Republic)*

The Sudan Gezira Scheme occupies more than a million acres of the triangle of land bounded by the Blue and White Niles and by the Sennar–Kosti railway line. The weed vegetation of this scheme is described in relation to geography, rainfall, cropping and weeding.

The sound economics of fallow weeding have been proved by the increased yields of cotton thereby made possible, and experiments, using both hoeing machinery and chemical sprays, are continuing in order to bring down costs and as an insurance against shortages of hand labour. The dangers of long-term changes in the weed flora of the area, or of the artificial production of a 'dust-bowl', have been shown to be negligible.

Perennial Grasses as a Limiting Factor in Tropical Agriculture and Methods for Their Control *by S. D. Fleming (Fisons Pest Control (E.A.) Ltd.)*

Of the steps advocated for the eradication of couch grass and other perennial grasses, hand digging is likely to be the most efficient, but this is deceptive, as decouched areas can become reinfested very rapidly. There is no machinery available which can handle the complete removal of the rhizomes or render them inviable as a result of the action of the machine, by cutting, digging, crushing etc.

Cover cropping has shown promise, but lacking a vigorous plant material which can cope with climate, soil and the perennial grasses, this must be considered as a long shot.

Recent Work on Control of Weeds in Maize *by C. Parker and D. G. Ashby (Fisons Pest Control (S. Africa) Ltd.)*

A single pre-emergence application of CP 18–15 on maize selectively controls annual grasses and all important dicotyledonous weeds, except *Striga asiatica*, but including *Datura* spp. and *Xanthium pungens*. Its persistent and prolonged effect, and its ability to induce severe adverse symptoms in almost all the dicotyledonous weeds at any stage of growth make it more reliable than 2,4–D under conditions of erratic rainfall. Provided that the safety to the maize crop can be confirmed under a wider range of conditions, CP 18–15 could prove a useful improvement on 2,4–D and MCPA despite the resistance of *Striga* and *Cyperus* spp.

Prof. A. S. Crafts, Univ. of Calif., U.S.A., explains his research on the uptake and distribution of herbicides in plants. The plants were treated with herbicides containing radioactive tracer elements and their subsequent distribution through the sap stream was detected by pressing the plants against X-ray film. The white sheets are the original pressed plants and the grey ones are radio-autographs showing the distribution of the herbicide.

Photo: Fisons Ltd.

It is concluded that as most of the plantation crops will hold their own against couch given a chance to fill in their canopy or spread their growth, the use of herbicides is the real answer to the problem of controlling perennial grasses, especially couch grass, with herbicides like dalapon and ATA.

Weed Problems and Control Practices in South Africa *by E. R. Hattingh (African Explosives and Chemical Industries Ltd.)*

The five main ecological zones are described, *viz.* the Fynbos or Mediterranean region of the South-West Cape, the forest areas, the Karroo (desert or semi-desert), the grasslands and the bushveld. The chemical weed control practices in each are stated and their limitations with respect to cereal crops and pastures, sugar - cane, groundnuts, sorghum, potatoes and fruit are examined.

Couch grass killed on a hedge bottom by a border spray of ' Dowpon '. The hedge to the right of the stake has not been treated

Control of Couch Grasses in Coffee *by G. W. Ivens (Colonial Pesticides Research Unit, Tanganyika)*

Couch grasses, *Cynodon* spp., cause extensive damage to all the plantation crops grown in East Africa, as well as to arable crops. The impossibility of eradicating these grasses by mechanical methods and the high cost of digging them out by hand makes a chemical control method very desirable.

Previous trials with TCA, sodium trichloroacetate, showed that control of couch grasses could only be achieved at rates which caused serious injury to coffee, sisal etc.

Recent trials, however, suggest that dalapon (sodium salt of 2,2-dichloropropionic acid) and amino-triazole are promising chemicals for the control of the couch grasses *Cynodon dactylon* and *Digitaria scalarum* in coffee. Under the conditions of the experiments, the two chemicals had very similar effects on the grasses at equivalent rates, but, although amino-triazole appears to be less liable to cause crop injury, this advantage is outweighed by its higher cost. Applied under moist conditions when the grass shoots are making rapid growth, dalapon has given a high degree of control at 10 lb./acre and at this rate it rarely causes more than temporary injury to the crop, but it is essential that the chemical should be applied as evenly as possible. It is also desirable that treatment should be carried out early in the rains, when the grass is at its most susceptible stage and in order to avoid prolonged persistence of the chemical in the soil.

The creeping underground stems or rhizomes of couch, Cynodon dactylodon
Photos: Dow Agrochemicals Ltd.

Comparative Effectiveness of MCPA and 2,4-D Derivatives in Pre-emergence Control of Weeds in Sugar-Cane in Mauritius *by E. Rochecouste (Mauritius Sugar Industry Research Institute)*

Chemical weeding has become a standard practice in Mauritius and, in general, MCPA and 2,4-D derivatives are widely used on sugar estates in pre-emergence applications. In order to evaluate the efficacy of these synthetic plant-growth regulators under the different soil and climatic conditions prevailing in the island two series of experiments were laid down and the principal conclusions were: (i) the sodium and potassium salts of MCPA were the most effective treatments in all trials; (ii) the sodium and dimethyl amine salts of 2,4-D were the second best treatments; (iii) the butoxy-ethanol ester was as good as the tri-ethanolamine salt, but the volatile esters, isopropyl and ethyl, proved the least effective.

(To be continued)

Ginger in Jamaica

ANNE PRENTICE

THE ginger-growing district of Jamaica lies in the central mountains of the island, in the parishes of Clarendon and East Manchester. The area is about 65,000–70,000 square acres and corresponds approximately to the Christiana Area Land Authority (C.A.L.A.), which is a highland region 1,500–3,000 ft. a.s.l.

The ginger of commerce is the rhizome or underground stem of Zingiber officinale, *a perennial reed-like plant, about 3 to 4 ft. in height. Its chief use is as a sweetmeat, spice or curry-stuff, and as an aromatic or stomachic medicine. The market for ginger is very unstable for the reasons given in this article.*

Geology and soils

Structurally, central Jamaica is a great anticline with tertiary and cretaceous limestones on the outer flanks to north and south, and older cretaceous igneous conglomerates or tuffs, exposed down the spine of the anticline. The land is dissected by deep erosion, giving a rugged topography and offering steep slopes for cultivation. In some places the topsoil has disappeared and even the subsoil is being eroded, while in a few districts on the deeply-dissected spine of the anticline there is no soil at all, and even the parent rock is being eroded.

In general, soil in the ginger area, on both limestone and conglomerates, is clay loam, stiff after rain and drying out in hard lumps. From the farmer's point of view it is heavy to work. Soil drainage tends to be poor, unless the slope is excessive, and the soils are generally acid.

Because of the steep slopes, in places 30° and over, soil erosion is serious. One of the greatest disadvantages of ginger, then, is the soil erosion caused by its cultivation. The C.A.L.A. strongly recommends contour strips of sown grass, alternating between strips of ginger.

Temperature and rainfall

The climate here is generous towards crop growing. Mean annual temperature in the mountains of central Jamaica is 70°F and rainfall is 72 in. per year. Heavy rain is expected in May and the planting of various crops follows the spring rains. June is often a dry month, but some rain is usual in July and August. For a month from mid-August there is a dry period. More rainfall is expected in September–October, and again sowing follows the rain. The period November–March is dry, but, being winter, is cooler. However, the rainfall is not reliable and severe droughts do occur.

Cultivation and yields

Ginger is a crop which requires considerable rain, but a well-drained soil, and thus it is well suited to the steep, though clay-covered, slopes. The roots are planted in May–June between rows of yams, and very often cocoa as well, both of which provide shade for the ginger. Average yields give about 1,400–1,800 lb. *dry* ginger per acre, but may fall to 700 lb. in a poor season. Average yields using chemical fertilisers will rise to 2,500 lb. per acre, but the small farmers cannot afford sufficient fertiliser to improve their yields.

Ginger is essentially a small farmer's crop because it has high value for its bulk. The farm holdings are usually under 5 acres in size and some are only ¼ acre. It is common for one family's land to be distributed as small scattered parcels, varying in size from a few square chains to 2 acres. On these few acres a farmer will grow not one crop at a time, but four or five, and very possibly plant the land twice in one year. Cultivation is intensive, the work all being done by manual labour.

Besides ginger, other principal crops include bananas, yams, Irish potatoes, cane and coffee. In the valleys below there are also citrus orchards. These crops are all to some degree cash crops, the family retaining only what it needs for food; maize is also grown as a subsistence crop.

Harvesting and drying

In January and February the green ginger is harvested, and the women have the skilled but troublesome

Samples of commercial ginger. The ' hands ' are so-called because of their palmate shape, and they are exported, either peeled or unpeeled. The above is the raw unpeeled product

job of washing, peeling and drying the crop. Drying involves laying out the branching 'hands' of ginger in the sun and taking them in every night for five or six days. The green ginger produces about 30% of its weight of dry ginger.

The dry ginger is sold to import and export firms operating in Spaldings and Christiana. In the Spaldings centre about 20 women are employed at 3*s.* 3*d.* per day, grading the dry product into four categories.

Market fluctuations

Since 1952, the selling price has varied from 1*s.* to 5*s.* per lb., and farmers who have to depend on ginger as a major source of income have been at a loss to know what to do. One year high ginger prices will attract farmers to risk the heavy cost of its cultivation; the following year the market is flooded, prices are down and farmers cannot afford to keep back even enough green ginger for planting. In consequence supply drops and prices soar again.

A feature of ginger cultivation is that the cost of cultivation and preparation is very high. It is estimated at over £150 per acre. If a farmer plants 1 acre and harvests an average crop, giving him about 1,600 lb. dry ginger, he must sell at a minimum price of 2*s.* 6*d.* per lb. to make any profit at all. It may even be profitable for the farmer to leave the ginger in the ground, undug, until the following year. At the present time there is no profit in ginger at all.

Unfortunately for Jamaica, the ginger market was severely undercut a few years ago by cheap African ginger. Jamaican ginger, which has very high aromatic quality, is used for blending with the cheaper ginger from Africa and China. There is demand only for a limited amount of high-grade ginger, so that any surplus has to be sold at prices comparable to the cheaper grades. In this event, prices in Jamaica fall and supply drops off.

Crop fluctuations

In 1951, Jamaica exported nearly three million lb. of ginger for almost £500,000. By 1953, the export was nearly five million lb., but the income was reduced to a little over £200,000. Then production fell heavily to 1½ million lb. in 1955, but income remained at about £200,000. By 1956 there was again a shortage of Jamaican ginger; prices rocketed, but only temporarily. The 1957 crop failed to sell out entirely, and the 1958 crop is now accumulating beside the 1957 surplus.

Another contributory factor to price fluctuations is that dry ginger will not keep in the island's tropical climate and must be cleared within six months of being dug. This means that Jamaica is obliged to sell ginger, regardless of price, to temperate countries, where it can safely be stored for a year or two.

Relief measures

Although ginger is one of the main export crops of the island, it cannot be compared with sugar, which earns £10-£11 million per year.

The Jamaican Government has undertaken to protect the very small grower by buying ginger at an advance price. This step was first taken in 1957, when the Government bought 30 tons at 2*s.* 6*d.* per lb. In 1957, prices rose later in the year and a further dividend of 9*d.* on each lb. was available. In May 1958, the Government promised to buy 50 tons from the very small growers at an advance price of 1*s.* 6*d.* per lb.

Looking ahead, the establishment of other high-value cash crops in the smallholdings will reduce the dependence on ginger. Bananas and coffee are already being re-established as economic crops. The groves were depleted in pre-war years, due to diseases attacking the banana plants which were used as shade for coffee. The banana groves are now being re-established and coffee planting is to follow later. With proper guidance and help, the C.A.L.A. district should again become a stable and prosperous region.

Technical News

Articles in the January issue of some of the other journals of the Leonard Hill Technical Group include the following:

Atomic World. – 'Nuclear Energy in Italy'; 'Measuring Machine Tool Wear by Isotopes' by E. Goodman.

Building Materials Export. – 'The Deterioration of Building Materials in Warm Regions' by W. H. Ransom.

Chemical & Process Engineering. – 'Gas Treatment and Dust Recovery'; 'Cutting the Cost of Heavy Water' by M. C. Reece, B.SC., PH.D.

Corrosion Technology. – 'Pipeline Protection in the Middle East – 1' by L. R. Sparrow, B.SC.(ENG.); 'Corrosion Research in Singapore' by R. A. Robinson, PH.D., D.SC., F.R.I.C., P. A. Cartwright, M.SC., A.I.M., and G. O. Thomas, B.SC., PH.D.

Dairy Engineering. – 'Plant Cleaning Routines' by S. M. Charlett; 'A Year of Australian Dairy Research'; 'Transport of Milk by Road' by E. H. B. Palmer.

Fibres. – 'Cotton – the Supremely Useful Fibre' by A. J. Hall, B.SC., F.R.I.C., F.T., F.S.D.C.

Food Manufacture. – 'The Problem of Improving Nutritive Value with Special Reference to the Enrichment of Foods – 6' by E. Menden and H. D. Cremer.

Manufacturing Chemist. – 'Essential Oils from the Belgian Congo'; 'The Burma Pharmaceutical Industry'; 'Computers and Process Control'.

Petroleum. – 'Oilfield Development' by Dr. C. A. Fothergill; 'Nitroparaffin as Engine Fuel' by Professor Starkman.

Paint Manufacture. – 'Instrumental Control of Temperature'; 'Instruments for Paint Testing'.

Public Works & Muck Shifter. – 'The Design and Construction of Dams for Water Supply and Hydro-electric schemes'.

Specimen copies of the above journals are available on application to Leonard Hill House.

Chemical Engineering Data Book

By T. K. Ross, PH.D., M.SC., M.I.CHEM.E., A.M.INST.E., and D. C. Freshwater, PH.D., A.M.I.CHEM.E.

Twenty-fourth edition. Pp. 1,200 with many illustrations, diagrams and charts. London. Leonard Hill (Books) Ltd. 1958. 84s.

Rice Land Cultivation

R. M. CHAMBERS, B.SC., B.AGR., M.I.B.A.E.
(Market Research Officer, Massey-Ferguson Ltd.)

Rice is said to be the world's oldest crop. It is possible to doubt this, but there is no reason to doubt the age of the primitive tools and the methods still being used in its cultivation, harvesting and processing.

THE extreme contrasts in rice production are remarkable. The labour of a single family of two or three people produces a thousand acres of rice in California. With day and night ploughing, using heavy tractors and multi-furrow ploughs; the use of selected seed; aircraft seeding; controlled irrigation, using powerful electric pumps; aircraft-applied sprays for the control of weed, insect and fungus; and mechanical harvesting of the crop of 40 cwt. per acre or more, and its transport to large privately- or co-operatively-owned stores, is one side of the picture. This picture, however, represents not more than 5% of total world production.

The other side of the picture is quite different with between the two a variety of methods making a story too long to tell here. The purpose of these notes, however, is not to examine all aspects down to the subsistence existence of the family of six to 10 people, working a smallholding of 3 or 4 acres for a bare living; working it entirely with hand tools, often home-made; growing the seedlings in a small nursery and transplanting them by hand; irrigating the small fields by hand methods, the water being hand-lifted from a well or stream; keeping day and night vigil against the ravages of bird and beast, so as to be able to harvest by hand each individual head of grain, and counting themselves lucky if they obtain a yield of 10 cwt. per acre; selling a small quantity only for cash and retaining the rest for a subsistence diet of rice and vegetables, supplemented by the occasional fish or fowl.

In between these two extremes, there is a vast area of rice lands which could be progressively mechanised.

A demonstration of a Massey-Ferguson '35' tractor, fitted with cage wheels and a rear-mounted paddy disk harrow

These lands are in large enough blocks, and are owned individually or co-operatively, but workstock, mainly bullocks, helpful though they have been in the past, limit the area which can be prepared. Many such areas are to be found in Asia, where over 90% of the world's rice acreage is situated. There is tremendous scope for machines to help the grower – but there are many problems needing to be solved in the application of machines to land which is waterlogged for several months of the year and is parched and baked hard for as many more.

The ideal tractor

The results to date have shown that, in contrast to the high-powered tractors with heavily-ballasted disk harrows, the smaller tractor of 25 to 35 h.p., with a specially designed light disk harrow mounted on its hydraulically depth-controlled linkage, makes possible the mechanical cultivation of wet paddy fields. These light tractors are fitted with rubber tyres to which are fitted cage-type extension wheels to give added traction. The light disk harrow runs on top of the trash of stubble and weeds, and forces it into the ground, where it is anchored for subsequent cutting when the machine is driven across the plot a second time. A third and sometimes a fourth run with the angle of the disks suitably adjusted by the operator, using a lever convenient to the tractor seat, will prepare the soil down to the required depth – an operation known as 'puddling'.

Bullock v. tractor

Proof of the value of mechanical operation is not lacking. Admittedly animals will be locally produced and will eat local produce (even if in doing so they limit the land available for producing human food), and they require more brawn than brain to operate them. They are, however, limited in their output of work to five hours per day, and a pair of bullocks in that time, using a locally produced wooden plough with an iron point, might puddle just about a third of an acre.

The tractor with its cage wheels (which simulate to some extent the

bullock's feet) and a mounted disk harrow can prepare over 3 acres in the same time – and it can be worked for 10 to 15 hours at a stretch when the need for land preparation is urgent.

On this basis, the inclusive operational cost has been independently assessed as being between 30% and 50% less by machine than by bullocks. Furthermore, a tractor can also be used to maintain the roads, repair bunds, transport farm produce and labourers, pump water, and hull the rice, as well as other jobs. Yet the capital required to enable all these jobs to be done will be no more than for the 10 pairs of bullocks which are required to puddle the same area in the same time. In addition, one could quote many instances where one half of a field was mechanically cultivated and the other was puddled by bullocks, with a resulting 20% to 30% increase in yield in favour of the machine.

Cultivation is admittedly only one of the operations in rice-growing – though it is the most important. Other jobs are being closely studied and recent advances in combine-harvester design, associated with a rice-breeding policy to produce strains more suitable for machine harvesting, make for confidence in future success, since complete harvesting machines are already being used in some rice-growing areas. Their introduction into Asia will undoubtedly be slow – but it will come, and when it does it will contribute to a higher standard of living and give more time to plan the work to further reduce the toil.

Rust and Corrosion

Millions of pounds are lost every year through the damage caused by rust and corrosion. Farm machinery is especially susceptible as it may be laid up for weeks on end, exposed to wet and damp conditions, after having been used with fertilisers and agricultural chemicals. In the old days the horse required careful attention and nursing; the machine, too, needs to be protected if it is to be ready for use, without the risk of expensive breakdowns, after a long period of idleness.

THE farmer of today invests a great deal of capital in buildings, machinery and equipment. Anyone who invests capital on this scale cannot afford to ignore the ruthless depreciation caused by rust and corrosion wherever metal has been used in the construction of buildings or machinery. Although anti-corrosion fluids are available, many farmers do not use them, despite the fact that so much machinery and equipment is left out of doors at the mercy of the elements.

There are two formulations which will meet the needs of most farmers. They are simple, harmless and cheap to use and can be applied to all ferrous and non-ferrous metals.

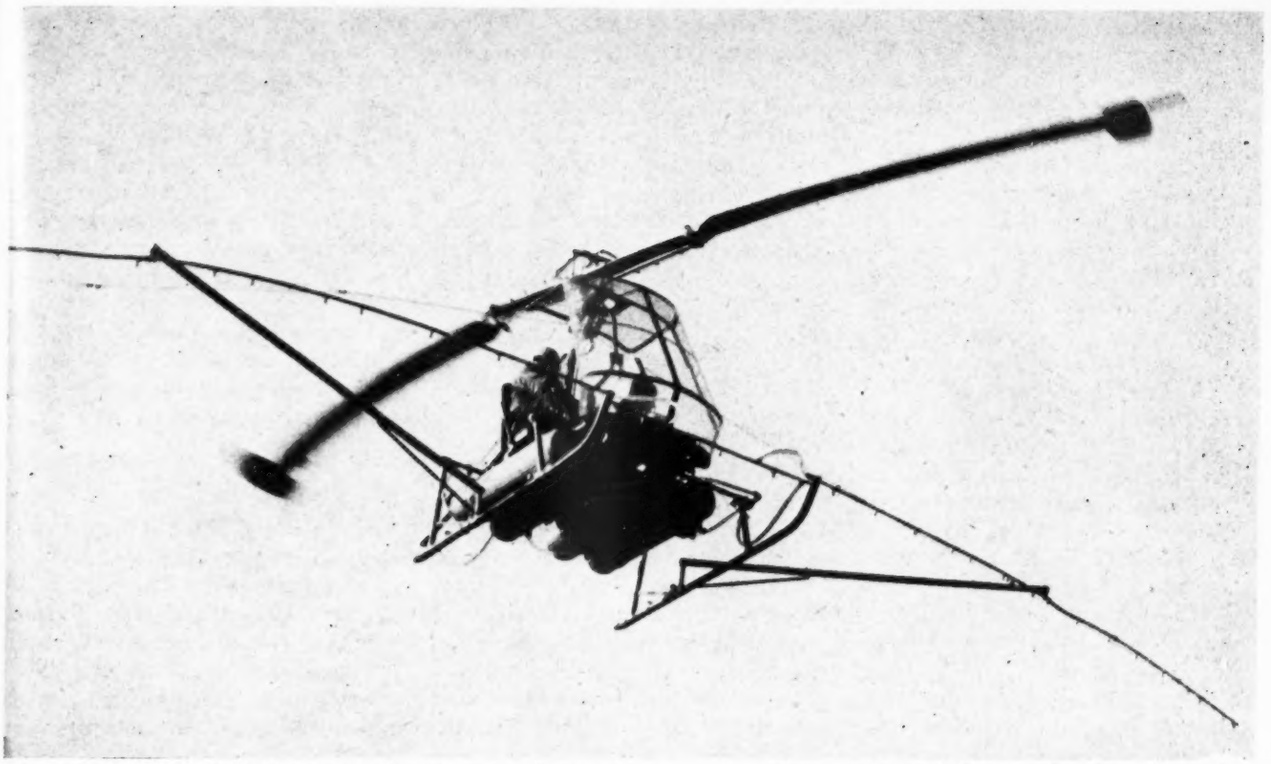
One is a *dismantling fluid* for the removal of all trace of rust on metal farm buildings, machinery and implements. This will also remove chemical corrosion from fertiliser distributors and free such parts as track adjuster bolts, idler pulley spindles and cleat bolts. This fluid can be applied by dipping, brushing or spraying. It has an extremely low surface tension, enabling deep penetration between corroded interlocking parts or surfaces and in a few minutes seized parts can be dismantled and any surface corrosion removed.

A corroded tractor clutch plate, which is unserviceable, but could be reconditioned and used again

A tractor clutch which has been reconditioned by the use of Plus Gas Formula A dismantling fluid

After rust has been thus removed, parts should be treated with a transparent *protective fluid*, which forms a complete, tough and sealed coating which adheres firmly to the metal. It should be used to protect all types of farm machinery from corrosion by moisture and chemicals, and to preserve metal floors in ventilated bins and tray driers. Applied to nuts and bolts before assembly it will prevent the formation of rust and ensure easy and rapid dismantling.

These new scientific formulations will assist world farmers to protect their equipment as mechanization supersedes animal power.



The ' Kolibrie ' ram-jet helicopter fitted with two 25-ft. spray booms can produce a swath of 66 ft. at an hourly average of 75 acres; it can remain in the air for 50–60 min. Note the jet engines at the ends of the rotor

The Jet Helicopter

Latest Product of the Space Age

THE complicated mechanism of the piston - engined helicopter has necessitated more attention to maintenance than the fixed-wing plane, and this has stood in the way of its greater use in agriculture, in spite of the obvious advantages of the helicopter for the aerial spraying of crops.

The latest idea of powering a helicopter by means of two jet engines, one at each end of the rotor, is indeed remarkable in its simplicity. Rotor-tip power requires no complicated transmission, no heavy gearbox, no free-running mechanism, no clutch and no torque compensation. The net result is that not only does the machine weigh less, but it also requires much less maintenance and attention.

Furthermore, while a failure of a ram-jet engine is extremely unlikely, it was demonstrated that the machine can descend quite gently to earth on the other engine. If the fuel supply should run low, there is first of all a warning light, and if this is ignored one engine becomes rough and irregular. This can be corrected by means of an electrical fuel pump, which will allow a normal landing.

Not even in his wildest dreams would Jules Verne have thought of placing the engines of his flying machines at the ends of the propellers.

Description

The ' Kolibrie ' (' Humming Bird ') ram-jet helicopter is the result of 10 years' research by the Nederlandse Helicopter Industrie (N.H.I.), of Holland. The prototype model was tested for a total of 500 hours of actual flight and the engine subjected to a 150-hour bench test, and the machine has been granted a certificate of airworthiness by the Department of Civil Aviation of the Netherlands.

It is a 2-engined, single rotor helicopter with a small single-bladed tail rotor for directional control, which is operated by means of foot pedals.

The ' Humming Bird ' hovering over its helicar trailer prior to effecting a perfect landing. It can also land safely even when moving at 15 m.p.h.

The fuselage is a simple open chassis with a large windshield; it carries two seats, the fuel tanks and the spray tanks lying between two sturdy skids of aluminium alloy tubing, forming the undercarriage.

As the tail rotor is for directional control only and is not needed for torque compensation, the tail boom is quite short; it is, in fact, only about 40% of the main rotor radius and this means much less weight. The main rotor, however, has been made considerably larger and four times heavier than those of other helicopters in the same class. This, it is stated, gives 12 times more kinetic energy for an emergency, such as a sudden turn.

The principal parts of the two jet engines are the air intake, the flame holders, the fuel nozzles, the combustion chamber and the exhaust. Ram-jets are, indeed, the simplest means of propulsion known today, though they have a higher fuel consumption than piston-type engines; the N.H.I. jets are run on ordinary kerosene or lamp oil, which can be obtained almost anywhere and costs generally only about a third of the price of petrol; the fire risk, too, is, of course, far less.

Operation

This fuel is sent out to the wing tips by centrifugal force. A small auxiliary engine – a 1-cylinder, 2-stroke, 2-h.p., air-cooled engine – is needed to accelerate the rotor up to the necessary speed, but after that it is no longer required. The fuel-air mixture is ignited by a single sparking plug in the combustion chamber and, as soon as the jet engine is operating, the ignition, too, can be switched off, as the re-circulation of the burning gases thereafter keeps the flame going. The flow of fuel is controlled by means of a twist grip and the movement of the rotors gradually accelerates up to the speed required for take-off.

One of the most remarkable features demonstrated was the simple and rapid replacement of an engine, which was done in a matter of minutes. The engine is connected to the rotor tip by two well-secured bolts and the fuel line and electric circuits are automatically made good. A jet engine weighs only 20 lb.

Performance

The maximum flying speed is given as 62 m.p.h. and the operational speed as 15 to 50 m.p.h. Its total flying time under load is 50 minutes at optimum speed; in other words, it can fly 15 miles and return to its base to refuel – a total of 30 miles in all. Its ' ceiling ' has not yet been determined. One unloaded machine has, however, been taken up to 4,000 ft. and one carrying its full load has been lifted to 1,400 ft. The rate of climb with the maximum overall weight of 1,430 lb. is 6 ft. per sec.; at 1,000 lb. it is 23 ft. per sec. The empty weight is 530 lb., allowing 904 lb. for pilot, fuel, spray booms and spray liquid.

Crop spraying

The ' Kolibrie ' H3 helicopter has been specially designed for crop spraying, dusting and seeding at very low altitudes at low speeds. The spray boom of stainless steel is flexible and collapsible, so that if it is struck against the ground or a tree, there is little risk of damage to the machine. The boom extends beyond the rotors, so the pilot need not worry when flying near trees or buildings, as the flexible boom will strike the obstruction before the rotors.

It is then possible for him to take quick evasive action because of the inertia stored in the heavy rotor with its two 20-lb. ram-jet engines at the tips, which together represent a large amount of rotational energy. In such an emergency some of this energy may safely be transferred into additional performance, *i.e.* as extra helicopter energy. At the maximum all-up weight this gives an additional 20 ft. per sec. in rate of climb or turn.

With two 25-ft. spray booms, the machine will spray a width of 66 ft. An hourly average of 75 acres (over 300,000 sq. m.) is claimed and the helicopter cost per acre varies between *4s. 1d.* and *7s. 3d.*

Other uses

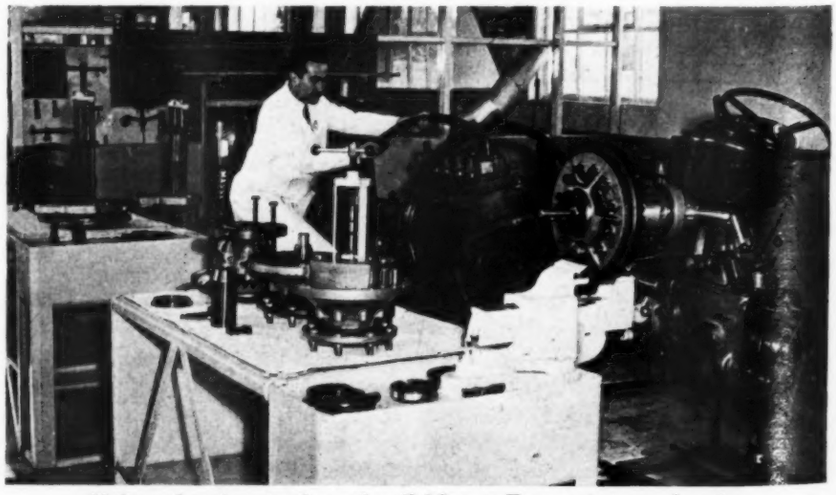
In flight we found it was smooth and appeared to be simple to manoeuvre, which makes it ideal for aerial photography and hovering with exact precision over an area being surveyed.

Other possible uses in agriculture, forestry and land development are air surveying, plantation supervision, dropping supplies to working parties, taking injured or sick men from out of the jungle to the nearest road, and for landings in swamps, mudbanks or flooded areas.

Servicing Farm Machinery

The problems of servicing farm tractors in swamp regions, in dense jungle and in desert areas were discussed by delegates brought from all parts of the world at a week-long conference in Warwickshire, England.

Collections of special tools and devices, costing hundreds of pounds, were demonstrated by skilled instructors of the Massey-Ferguson School of Farm Mechanisation at Stoneleigh Abbey and a team of 12 specialists lead the discussions on subjects ranging from the problems of providing service in jungle or desert areas in under-developed countries, to the use of mobile radio-telephones in agriculture, the deployment of emergency repair vehicles and general administrative problems.



Universal engine stand to take all Massey-Ferguson range of engines

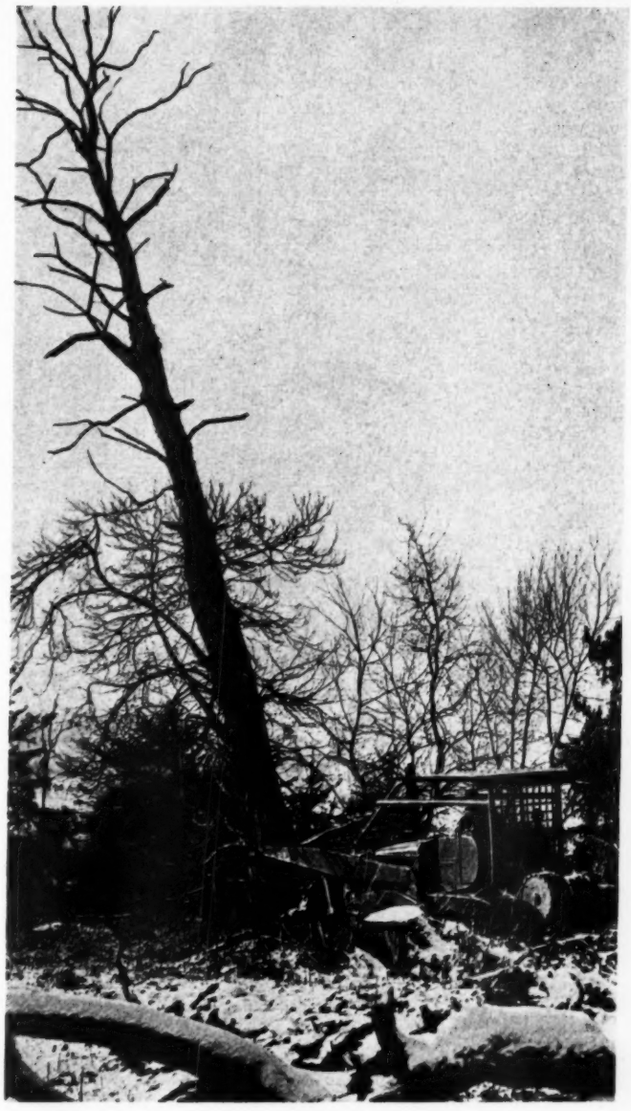
Timber— A Tractor Harvest

ALAN H. BROWN
(*Editor, 'Vickers Tractor News'*)

The powerful throb of diesels reverberates through the world's forests, where once the only unusual sounds were those of steel saw teeth biting into wood, of huge trees crashing to the ground, of men, elephants and horses straining hard as the heavy trunks were dragged slowly away.

NO longer are forests regarded as Mother Nature's cornucopia of wood, to be depleted at will. Trees are now treated as a crop to be grown, harvested and re-grown, so that a continuous and adequate supply of timber will always be available. *Planned logging operations actually increase forest productivity, because man, by co-operating with nature, can produce a new forest as good as, if not better than, the original.*

Today, too, timber is a tractor harvest. The whole range of scientific timber - extraction operations, from felling to removal, can be – and often is – carried out by fast-moving crawler-tractors.



A Vickers VR180 'Vigor' tractor fitted with a tree-dozer tackling a tall tree in Shropshire, England

The modern approach

Such operations are plotted and planned as carefully as a civil engineering project. Indeed, so far from the early, haphazard days is the logging industry now removed that even the wood volume of an area is calculated and mapped. Base camps, where living accommodation, stores, workshops, first-aid and other facilities are provided, and from where operations can be controlled 'on the spot', are in effect miniature – if mobile – towns.

Fire – that dreaded desecrator of the forest – is better controlled and the risk minimised by stringent precautions in which air-radio coverage is used to great effect in fire-fighting.

Felling and planting programmes are carefully dovetailed. After the heavy timber and wood, unsuitable for sawmilling, have been removed the ground is turned over to the ploughs and planting machines. The maintenance men then move in to supervise the growth of the new crop and transplant the saplings. Continuous studies of growth behaviour and growth rate are made by means of sample plots.

Advantages of crawler-tractors

This, briefly, is the manner of fitting the world's timber supply to ever-increasing demand. What is the role of the heavy crawler-tractor?

Before answering that question it is necessary to understand fully the special advantages of the crawler-tractor, as applied to logging:

1. It provides power wherever power is needed, *i.e.* it advances with the work.
2. Its tractive power is far greater than that of any other vehicle.
3. Its easy manoeuvrability makes it the ideal tool for work in confined spaces.
4. Some tractors, such as the Vickers 'Vigor', are capable of working at comparatively high speeds – 9.73 m.p.h. in sixth gear – thereby speeding up the work.
5. A variety of matched equipment is available with this track-type tractor. With ripper, roller, dozer, scraper and many other useful attachments, the 'Vigor' has proved its versatility.

To sum up: This crawler-tractor provides the benefits of power, traction, manoeuvrability, speed and versatility.

Logging operations

The actual felling is usually done by axe, cross-cut saw or chain saw; but the work can be materially accelerated and assisted by a tractor equipped with a logging winch and a tree-dozer. The first pulls the tree down and with the second the tree is virtually dug out of

British Columbia. A Vickers tractor with a fore-mounted scraper and a rear-mounted logging arch or ' husky '

the ground and pushed free.

The journey from the forest to the sawmill is usually made by road, rail or water, but the movement and extraction from the forest is best done by tractor, fitted with a logging winch or towing a logging arch or ' sulky '.

The establishment of base camps, with their attendant roads and drainage schemes, involves land clearing and levelling: another job for the tractor, fitted with cable or hydraulic dozer equipment, or towing an earthmoving scraper or compaction roller. The tractor is also needed to clear ground prior to planting, to work on soil-conservation schemes and to provide the motive power for ploughs and planting machines.

Fire precautions to protect the young plantations also involve the use of tractors – again fitted with cable or hydraulic dozer equipment – for the cutting of fire-breaks.

Thus the circle is complete and the question is answered. When the young trees reach full stature felling begins again and the crawler-tractor is once more called upon to play its part. In the wooded areas of the world, in forest and jungle alike, the tractor is effectively demonstrating its unique value in forestry operations.

Victoria, Australia. A Vickers tractor engaged in heavy logging operations, showing also its winch attachment in the rear

Milk by Pipeline

Farmers in the mountains of Austria have solved the problem of transport in sending milk to cities and towns. The International Federation of Agricultural Producers reports that instead of relying on trucks to cart the milk over the poor roads in some mountainous parts of Austria, milk is being piped into towns.

This novel method of delivering milk was first experimented with at Mittersill. A farm lying 3,000 ft. above the town and a mile away was connected by a plastic pipeline with Mittersill. Milk was sent through the pipeline, enough milk swishing through for normal delivery in 21 min. The pipeline is washed between milkings. Similar systems are being adopted at several places in Austria.

Transformation Through Lime

At least one million acres of undeveloped range and heath country in South Australia can now be transformed into good grazing land as the result of successful field trials conducted by the Department of Agriculture with lime used as a fertiliser.

It is estimated that large areas of sand ridges previously regarded as wasteland could now grow clover pastures and will eventually support two million sheep. This range country, with extremely infertile deep sandy soils and covered by stringy bark scrub, has been a problem for many years. Even with complicated applications of fertiliser and trace elements, clover establishment has been virtually impossible. Recent experiments have shown that agricultural lime, applied with the superphosphate mixture is the answer to the problem.

New Publications

Plantation Crops

Published for the Commonwealth Economic Committee by H.M. Stationery Office. 1958. 5*s*.

This report reviews the significant trends during the past few years in world production, consumption, trade and prices relating to sugar, tea, coffee, cocoa, spices, tobacco and rubber. The authors admit that these commodities, here linked together under the title 'Plantation Crops', recall the time when they were produced mainly on large units, *i.e.* plantations and estates. This admission implies a realisation that smallholdings now play a conspicuous part in production of these crops; with the possible exception of sugar, this is undoubtedly a fact. It certainly applies to tea, coffee and cocoa, while smallholders produce at least half the world's enormous crop of rubber, a great deal of the tropically-grown tobacco and a not inconspicuous part of all spices.

The distinction between large-scale producers and smallholders is not merely of academic interest; it is the fundamental factor upon which the well-being and future development of industries depends. In retaining the largely outdated title to this publication, the Intelligence Branch of the Commonwealth Economic Committee fails to grant recognition to the fact that the pattern of world production of these crops is changing, demanding reorientation of ideas on the economics of production and marketing.

The present report includes a summary of international agreements in force affecting plantation crops in various countries, and statements on export and import duties, but does not record the declared policies of governments concerning such matters as nationality of ownership, security of tenure and capital, factors which largely govern the confidence of investors and the trend of future production. The reader studies such reports as the present less with the object of learning the recent history of these industries than of finding data upon which to assess future production and consumption. Vagaries of the weather may influence production and have repercussions on consumption, but in modern times a more potent factor is to be found in the policies of governments in the countries of production.

A valuable paragraph discusses yields per acre of sugar in different countries, a brief reference is made to tobacco yields, but no parallel information is given concerning coffee, tea, cocoa or rubber. Inclusion of this information would have added greatly to the value of this publication.

Apparently the main object of 'Plantation Crops' is to examine the position which these important crops hold in the export trade of Commonwealth countries. This aspect is clearly and concisely stated. Cocoa accounts for nearly three-fifths of Ghana trade and tea for about two-thirds of that of Ceylon; sugar represents about one-half of all shipments from Fiji and British Guiana, while Mauritius and Barbados are very largely dependent on it as an export crop. Rubber constitutes nearly one-half of gross shipments from Malaya and coffee represents more than one-third of the export trade of British East Africa. More than four-fifths of the tea entering world trade and approximately one-half of the cocoa and rubber is shipped by Commonwealth countries.

Interesting figures are given concerning consumption of these products. The *per caput* consumption of sugar in the U.K. is about 111 lb. per annum, and tea 10.1 lb. per annum. The quantity of coffee taken continued to increase in both the U.S.A. and Canada, being 15.5 and 8.1 lb. per head respectively, as compared with 1.5 lb. in the U.K. *Per caput* (excluding children) consumption of leaf tobacco in the U.S.A. was 11.5 lb. per annum, Canadian consumption rose to 6.9 lb., but the amount consumed per head in the U.K. remains about 4.6 lb. per annum.

D. H. GRIST

Potato in West Bengal

By H. C. Choudhuri. Pp. 125, illustrations in colour and black and white. Calcutta: Government Press, West Bengal. 1958. Rs. 6 or 9*s*. 9*d*.

The potato occupies an important place in the world's food economy, yet the countries of Asia are only small producers in relation to their huge populations. It is because of this, states the Director of Agriculture of West Bengal, that the author, who has specialised in this crop, was selected to write this concise account, based on his many years' experience and intimate knowledge of the crop as a teacher, research worker and development officer.

The book contains a great deal of useful first-hand information, but it lacks continuity and arrangement. Thus the important subject of potato diseases is dealt with in chapters 2, 4, 7, 9, 12 and 15; the botany of the crop is variously treated in chapters 2, 6, 8 and 14; and the many references are repetitious in that they appear several times at the ends of chapters and again as an appendix at the end of the book. It is disturbing to the reader that the captions to the excellent illustrations are missing and appear all together as yet another appendix – a quite unnecessary procedure which all adds to the difficulty of reading.

The sole conclusion of 81 fertiliser trials that an NPK application at 80 : 160 : 80 per acre gave the highest yield would have been more convincing if the experiments had been properly laid out so as to allow a proper statistical analysis of the results and, furthermore, a proper assessment should most certainly have been made of the financial profit to be derived. While the scientist may regard this as beneath his notice, it is an issue of real importance to the peasant cultivator.

F. C. COOKE

H.M.S.O.

Grassland Utilisation. Report of the Committee. 1958. 6*s*. 5*d*.

Hay: Quality and Feeding. Advisory Leaflet No. 558. 3*s*. 5*d*.

Register of Potato Crops Certified, 1958. 11*s*.

Agricultural Land Commission. 11th Annual Report, 1957–58. 2*s*. 5*d*.

Specifications and Methods of Analysis for Certain Pesticides. Technical Bulletin No. 1. 3rd edition. 1958. 7*s*. 6*d*.

Statistics on Tropical Timber, 1956. 6*s*. 6*d*.

Apples and Pears. Bulletin No. 133, 3rd edition. 1958. 7*s*. 7*d*.

Agricultural Chemicals

Guide to Selective Weedkilling

This is the title of a brochure, issued by *Plant Protection Ltd.*, which may be obtained through our Reader Service. Recent researches have led to the discovery of new weedkilling chemicals and extensions to the use of those already existing. This booklet is intended to guide the farmer in his choice for the control of weeds in cereal crops, in grassland, in linseed, in flax, in asparagus and in peas, and for the destruction of woody weeds, such as brambles, gorse, elder, hazel and hawthorn, which can be very troublesome in pastures and rough grazings, road verges, ditches, and dykes, and firebreaks. The use of weedkillers is also essential when reclaiming neglected marginal lands.

Four weedkillers are described 'Agroxone, K', 'Fernimine', 'Bexone' and 'Trioxone' and useful advice is given on spraying and the storage of sprayers.

A New Miticide

The official tolerances have now been set by F.D.A. for the use of 'Kelthane', according to the *Rohm & Haas Reporter*. This is a powerful new miticide for full-season use, which is effective at low concentrations. The small amount of residue remaining on the foliage retains its mite-killing power for a long period and, as a result, fewer applications of the material are necessary during the season.

The residual tolerances allowed are 10 parts per million on citrus, peaches, nectarines and apricots; and five parts per million on other fruits and vegetables. The product may be used up to two days before harvest on strawberries, raspberries, tomatoes, gourds and pumpkins, and egg-plant and peppers; to within seven days of harvest on citrus, apples, pears, cherries, plums, grapes and beans; and up to 14 days for peaches, apricots and nectarines.

'Kelthane' is supplied as a wettable powder, 'Kelthane W', and, as it is compatible with all common, non-alkaline pesticides, it is possible to combine it with other spray chemicals in a single application. The product has a low degree of toxicity to humans and no unusual precautions or special equipment is needed. It also causes no fruit or foliage injury at the approved rates of application, according to official tests.

Reader Service

For further information on any item reviewed in this issue please write to:

Reader Service
WORLD CROPS,
Leonard Hill House,
Eden Street, London, N.W.1,
England

Plastic Pots

Two additional sizes have now been added to the 'Jurypot' range of flower pots which are offered by *Jury Holloware Ltd.* in many colours. They are made of unbreakable polythene and are available now in the following sizes: 2 in., 3 in., 4½ in., 6 in. and 10 in. For nurserymen the colours should find favour for displays; for those engaged in plant breeding, research trials and experimental work the use of coloured pots will prevent mistakes and assist in planning the work.

The advantages claimed for plastic over clay pots are: (1) there is only one-quarter the amount of evaporation, thus watering can be less frequent and is more easily controlled; (2) in plastic the root system utilises all the soil in the pot, whereas with clay the roots chase the evaporating water to the walls; (3) the entire soil area is maintained at a higher and more uniform temperature in plastic pots; (4) there is slower cooling, yet more rapid warming up of the soil in plastic pots; (5) the plastic pots are much lighter, virtually unbreakable and easier to clean.

The claim is put forward that this will permit the use of smaller pots, thus saving greenhouse space and requiring less compost. The danger of frost damage is minimised; it is claimed also that there is earlier blooming and sturdier plants are obtained.

A New Herbicide

Stauffer Chemical Co. has completed plans to build the first plant to produce the selective herbicide 'Eptam' on a commercial scale at Richmond, California. It is anticipated that this will be in production by January 1959.

'Eptam' – ethyl di-n-propylthiolcarbamate (EPTC) – was developed by their research laboratories in 1955 and during the past three seasons it has been produced successively in laboratory, pilot plant and semi-commercial quantities. The herbicide is to be marketed as an emulsified liquid and as a granular formulation.

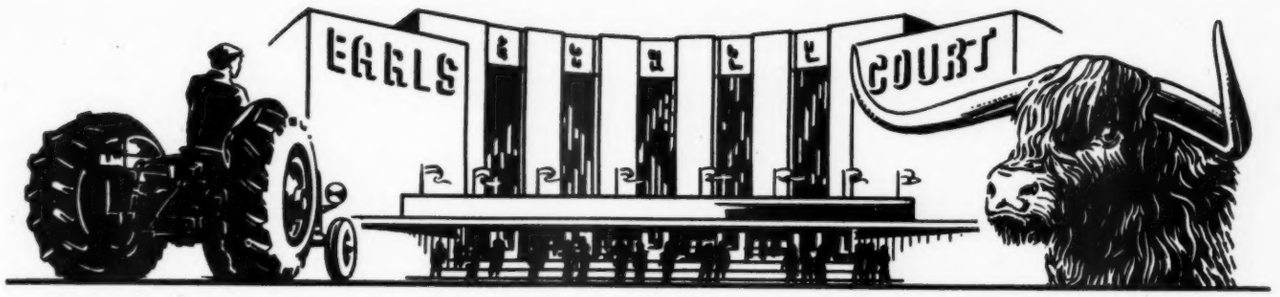
Extensive experimental work in a number of countries has indicated that many crops, ranging from forage legumes, such as clover and alfalfa, to vegetables, such as corn, carrots and beets, are tolerant to the pre-emergence application of the new herbicide. The chemical, so used, has given excellent control of many grassy weeds, including yellow and purple nutgrass, quackgrass and Johnson grass, as well as broad-leaf weeds, such as red-root pigweed and purslane.

Fire Fighting

The introduction of a new leak-proof carbon dioxide fire extinguisher, Model 1510, weighing only 10 lb., is announced by *Nu-Swift Ltd.* Intended for fighting inflammable liquid fires and fires involving electrical equipment indoors, the new extinguisher has a 15-ft. range.

Carbon dioxide is non-damaging in use and leaves no residue and it will penetrate into places otherwise inaccessible. Thus it is invaluable for fighting fires in laboratories, or fires in stocks of fine chemicals or complicated electrical equipment.

The new extinguisher, which is operated in the upright position by striking a knob, is available for immediate delivery in U.K. or for export overseas.



Special Smithfield Supplement

Britain cannot feed her huge population. She has been forced by necessity to learn how to make the most of her available land; forced to mechanise and modernise her agricultural methods; a serious shortage of foreign currency and a threatened shortage of food forced the development of the tractor industry. For the same reason, she is vitally interested in increased food production in overseas countries and exports of agricultural machinery have rocketed from £1¾ million in 1938 to over £100 million in 1958.

THE first Smithfield Show was staged in a livery stables at Smithfield in North London in 1798 – nearly 200 years ago. The Smithfield Show of 1958 was, in fact, the biggest enclosed agricultural exhibition ever to be held anywhere in the world.

The live exhibits – representative of the finest pedigree stock in the country – naturally occupied the central position and took up an area of 280,000 sq. ft., but, with the progressive development of agriculture, the 1958 exhibition again emphasised the increasing importance of agricultural machinery and agricultural chemicals.

In the vast halls and galleries, surrounding the judging rings, over 400 firms displayed exhibits ranging from an automatic bird scarer to an ingenious invention for collecting stones and rocks on agricultural land; from a small hand sprayer to a gigantic power sprayer; from a 3-wheeled mechanical cart to a monster self-propelled combine harvester. All the leading makes of tractor were represented and each took a multiple stand to show off their splendid machines to the best advantage.

The needs of the small farmer continue to exert an influence on design, and the new forage harvesters are no less than an urgent invitation to all farmers to revise their ideas with regard to the most effective use of pastures.

The number of new agricultural machines and implements seems to increase in geometrical progression and in the following pages it has been possible only to give very brief details of about a quarter of the exhibits, owing to limitations of space.

A

Allis-Chalmers (Great Britain) Ltd. were showing for the first time a 10-ft. gleaner combine-harvester and a high-clearance and a low-clearance D-272 tractor. The high-clearance tractor is designed for high crops, such as celery, rose bushes and bush fruits, as it allows a ground clearance of 29 in.; conversely, the low-clearance model is for operation where there are limitations to overall height, as in the cultivation of orchard crops.

In addition to their trailer, tractor-mounted, and truck-mounted sprayers,

The lightweight monowheel 'Rapid' sprayer is suitable for use in market gardens and agricultural stations

E. Allman & Co. Ltd. introduced for the first time a miniature boom sprayer of the push type, a mono-wheel on which the weight of the spray tank is nicely balanced against the weight of the boom. It is described as being particularly suitable for the application of weedkillers on sports grounds and in market gardens and it appeared to be very suitable for spraying road verges, and for work on test plots.

The Alvan Blanch Development Co. Ltd. were showing three complete drying machines and a part of a conveyor-drier. This conveyor grain drier has been used for the drying of wool and has been satisfactorily tested for the drying of coir. There was also a range of elevators and conveyors, an automatic sack weigher and an interesting machine – the combined horizontal roller-grinder-mixer.

Automotive Products Co. Ltd. had a display of their components for tractors and agricultural machinery – the latest Lockheed mechanical brake for tractors and trailers; the 'Purolator' air, oil and fuel filters; the new 'Autolube' fabric/nylon bearing tie rod joints; Borg & Beck clutches and a new p.t.-o.; and Lockheed-Avery flexible hoses and couplings.

B

Barford (Agricultural) Ltd. were showing three new products: a forage harvester, which, it is claimed, maintains a high rate of production of cut silage in variable ground conditions;

their 'Atom' tractor, powered by a 3-h.p. Villiers air-cooled petrol engine, and a tractor-mounted concrete mixer, which is recommended for mixing cattle feed. The new 'Atom 30' is a hand-directed powered cultivator with a range of tools and attachments suitable for the smallholder and market gardener.

Practically every need associated with the pumping of water can be met from the extensive range of equipment shown by *James Beresford & Sons Ltd.* There was a submersible electric pump for deep wells and boreholes, which can raise water from 1,000 ft. below the surface; the ' Watermaster ' tractor-mounted pump, which has proved most effective as an irrigation unit; and a range of fixed and portable pumps of various sizes.

A. B. Blanch & Co. Ltd. had a remarkable range of exhibits, including the ' Banger ' bird scarer, which has now been fitted with a 14-day time clock designed to switch on and off at predetermined times. Another new departure is the 2 BX model grain drier – a free-standing unit – which can be placed in position to suit individual requirements. This machine incorporates pneumatic equipment for blowing the wet and dry grain. They also showed the ' Stackhy ' bale loader for loading or offloading bales of hay or straw.

The centre-piece of the *Bomford* stand was the new 2-furrow reversible plough, which we reviewed in our October issue. Its outstanding feature is its ability to bury straw and trash completely, leaving a clean surface to the land. They also showed their hedgetrimmers and hedgemakers and put up a display of threadless irrigation equipment.

The new ' Sapper ' powerdozer, the ' Sapper ' reargrader and the ' Sapper ' ditcher were the principal exhibits on the stand of *Bomford & Evershed Ltd.* The powerdozer is a front-mounted blade of robust construction, controlled by a double-acting hydraulic ram, which can be angled or tilted to either side. The ditcher is tractor-drawn and powered; it works progressively along the ditch, depositing the spoil about 9 ft. away from the ditch centre.

As usual, *Frank Bonser & Co. Ltd.* were exhibiting their mounted and trailing rotary cultivators. The new 40-in. heavy-duty ' Agrotiller ' is now offered both as offset and as centrally-mounted models, both of which can withstand the power transmitted by the larger tractors. The very handy 3-wheeled Bonser truck was shown, as well as their forage harvester, a robust rotary flail with a cutting width of 46 in.

The new David Brown 'Albion' 2-furrow alternating mouldboard plough

The mighty 'Atom 30' 2-wheeled tractor, fitted with an adjustable plough and cutting a 6-in. furrow

The main feature of the exhibit by *Boots Pure Drug Co. Ltd.* was, of course, the ' Cornox ' range of weedkillers, which include ' Cornox D ', ' Cornox M ' and ' Iso-Cornox '. The last-named product, which was first announced at the Weed Control Conference of 1956, is a selective weedkiller, based on CMPP, 4-chloro, 2-methyl phenoxy propionic acid. This is now recommended for the control of scentless mayweed, in addition to cleavers, chickweed and many other weeds.

The ' Sta-Dri ' cabs for tractors are being constantly improved and *Bristol Metal Components Ltd.* have now introduced a full-vision backcloth which attracted a great deal of interest.

David Brown Ltd. laid special emphasis on the needs of overseas markets. The 'Albion' 3/2-furrow mounted disk plough, for instance, has done well under varying conditions. Their 2-furrow reversible disk plough is also designed for overseas, since positive pre-set adjustments eliminate the need for skilled supervision, and

A Bristol Metal Components cab, as fitted to a McCormick International tractor

marking out is unnecessary, the shape of the plot is immaterial, time is saved at every headland turn, and a level seedbed is achieved with no furrows and ridges to encourage erosion. Their tractor exhibits included the standard 2D with 14-h.p. air-cooled, rear-mounted, 2-cylinder diesel engine; the 'Narrow' 2D, a 41-in. version; the standard 900 tractor with 40-h.p. diesel engine and 6-speed gearbox; the 900 'Livedrive' tractor with 'live' hydraulics and 'live' p.t.-o.; and the 50TD crawler tractor with a 50-h.p. engine and 6-speed gearbox.

Two new items shown by *Byron Farm Machinery Ltd.* were a bagging-off attachment, consisting of a hopper with twin cut-off valves and sack hooks, on a telescopic tripod stand and an extension unit, suitable for use with the 'Byric' augers.

C

The two *Caterpillars* exhibited at Smithfield were the D4 and the D6 of 63 h.p. and 93 h.p. respectively, equipped with No. 41 hydraulic control and giving 50 h.p. and 75 h.p. at the drawbar. The several models shown were fitted with the simple and the No. 6A hydraulically-controlled bulldozers, the No. 4 toolbar, displaying chisel shanks, disk ridgers, ditchers and spring shank cultivators.

It is essential that every acre planted with potatoes should produce the highest possible yield. We were assured by *Messrs. J. W. Chafer Ltd.* that the new 'Dustmaster' tractor-mounted boom duster with the appropriate 'Dustox' fungicide dust, applied properly at the correct time, will ensure greener potato tops and produce a marked increase in saleable tonnage.

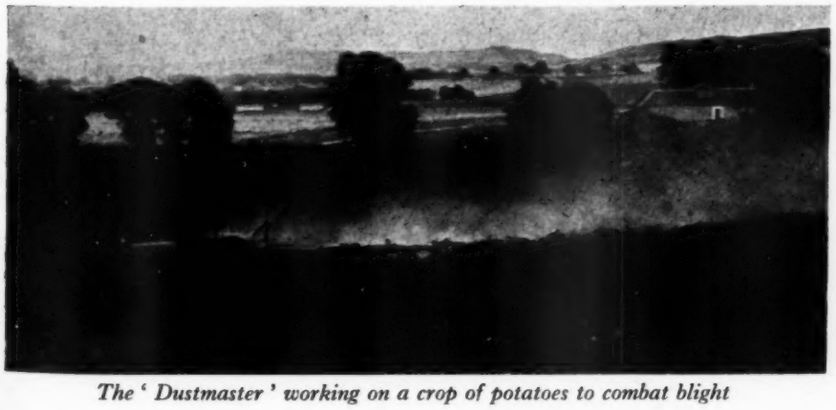
The latest Clifford cultivator – the Mk. III – was presented by *Clifford Cultivators Ltd.* It has a Villiers engine and develops 5.5 b.h.p. at 2,500 r.p.m. The depth of cut is adjustable in 2-in. stages down to 10 in., and even at this depth the machine has power in reserve. The handlebars are mounted on a single-column headstock and are fully adjustable for height, offset and reverse positioning.

There was a complete production line for sorting, pre-soaking, washing and drying potatoes, carrots and parsnips with a capacity of 4 tons per hour, and also a new celery washer on the stand of *Cooch & Sons Ltd.*

Cooper, Pegler & Co. Ltd. were showing their full range of spraying and dusting equipment, including knapsack models, small and large power machines, lances and nozzles.

The Crittall high-level pre-storage bin gives ample clearance for lorries and has three discharge points

Their new 15-ft. telescopic lance is designed for spraying high trees and the walls of buildings with a spray or jet, lifting to 20 to 25 ft. from the ground; it can be used with all types of spraying machines and can be fitted with a cone, fan or variable spray jet, according to requirements.



The 'Dustmaster' working on a crop of potatoes to combat blight

The new Farrow irrigation pump is driven from the p.t.-o. shaft of a tractor

In addition to their hot-dip galvanised steel grain storage silos, the *Crittall Mfg. Co. Ltd.* were showing two new items: their grain conveyor, comprising a 14.5 to 1 worm reduction gearbox coupled to a ½-h.p. electric motor; and a high-level pre-storage bin, which gives ample clearance for access of lorries and is fitted with three chain-operated discharge outlets.

D

Since last year *Dennings of Chard Ltd.* have introduced a 7-ft. 6-in. mounted tandem disk harrow into their range and this, together with a new haytedder, were shown for the first time. Other exhibits included 12- and 16-row grain and fertiliser drills, a 5-ft. rear-mounted mower, a 10-tine buckrake, a potato spinner and some mechanical saw benches.

Dorman Sprayer Co. Ltd. have increased their range of tractor-mounted sprayers to meet the demand for larger machines caused by the increased use of the latest selective weedkillers, such as CMPP, at low-volume or medium application (in place of DNOC as a high - volume application) requiring violent agitation in their trailer-drawn sprayers. They also introduced a new tractor-mounted mistblower, manufactured in conjunction with Bülow, of Denmark.

An entirely new tractor-mounted mistblower seen on the stand of *Drake & Fletcher* Ltd. had a fibreglass spray tank, a multi-vane centrifugal fan and multiple outlets, which are adjustable to give any desired spray pattern. It is also fitted with the N.I.A.E. atomising nozzle. In addition, they were showing the 'Mamba' shoulder-mounted sprayer for orchards, vine-

yards, market gardens and plantations, a new portable motorised dust gun which, even when filled, weighs only 24 lb., and various types of large mistblowers.

F

A new approach to the problems of handling and distributing liquid fertilisers and manures and sewage sludge directly on to fields was demonstrated by *Farrow & Sons Ltd.* as the Farrow Scheme of Organic Irrigation. This system incorporates one of their wide range of pumps, an aluminium pipeline or 'Plastidry' flexible hose with 'Hy-speed' couplings, and a special distributor for throwing thick liquids. They also showed a neat 2-wheeled pump unit for attachment to the rear p.t.-o. of a tractor.

In addition to the 'Mayrath' grain conveyors, *Gordon Felber & Co. Ltd.* were featuring the 'Microsol' system of disinfestation and their full range of 'Ideal' super-lap farm buildings, including the 1,000-bird fully-insulated broiler house. Two new accessories are now available for use with the 'Mayrath' conveyor – a robust adjustable spout and a 2-way bagging-off spout with stand.

Shown for the first time by *Fisher, Humphries & Co. Ltd.* was a new 3-furrow plough for mounting on category 2 linkage tractors, together with mouldboards for various purposes. Other exhibits were a 2-furrow lightweight plough for category 1 linkages, a mounted beet harvester, mounted subsoiler and mole drainer, and a mounted 3-row ridger.

The centre-piece of the stand of the *Ford Motor Co. Ltd.* was the new Fordson 'Power Major' 51.8-b.h.p. tractor and two Fordson 'Dexta' tractors on a rotating turntable. In addition, there was a 'Power Major' fitted with the new 'inertia starter', designed for countries where the temperatures are about 30°F. This is a compact unit which replaces the conventional starter motor and is intended to distribute the oil in the cold engine before starting. One of the 'Dexta' tractors was fitted with power-adjusted rear wheels and another was the special narrow model which has been developed specially for use in vineyards, young orchards, hop fields and soft fruit plantations.

The new 18-in. 'Hayterette' is more than a lawn mower. It is designed for cleaning up heavy grassland and road verges

H

Electric fencing equipment was exhibited by the *Harvest Saver and Implement Co. Ltd.* The new H.S.I. insulated electric fencing reel can be wound and unwound without the operator receiving a shock, because of an ingenious insulation device which isolates the wire and the wire-holding reel from the winding handles.

What promises to be a most popular machine is the new 18-in. 'Hayterette', a domestic rotary grass cutter, which we first saw at the Chelsea Flower Show; the power unit is a Villiers 7F 98-c.c. engine with a recoil starter. *Hayters Ltd.* were also showing the 6/14 trailed model Hayter grass cutter, which is powered from the rear p.t.-o. and gives a 6-ft. cut; the 26-in. Hayter rotary motor scythe having a Villiers 4-stroke, 256-c.c. engine; and the 24-in. hand-propelled rotary motor scythe with a Villiers 4-stroke, o.h.v., 147-c.c. engine.

I

The new *International Harvester* B-275 tractor, recently announced, was on show for the first time. Two features warrant attention. These are a particularly flexible gearbox, which offers the wide range of eight forward and two reverse speeds, and a constant running p.t.-o., which is in effect a 'live' p.t.-o. In addition to this 35-h.p. model, the company have also introduced the 'Farmall' B450, a powerful tractor of 55 h.p. with a weight of 6,000 lb. This, together with the adjustable swinging drawbar and a new type of linkage, ensures a tenacious grip on the ground. A single lever gives two stages of hydraulic response – the first builds up a limited pressure in the lifting cylinder, which is not enough to lift the implement, but is sufficient to relieve it of some of the load when necessary; the second is used to raise the implement clear of the ground.

J

The J.E.C. in-sack grain drier, which proved its worth during the wet weather in Britain last August, was shown by the *Jeffrey Engineering Co. Ltd.* – one model was oil-fired and the other propane gas-heated. The Kidd 'Rotaflail' 4-ft. forage harvester, exhibited for the first time, gave one an impression of immense strength and compactness. A new invention – the 'Gobro' swing saw – is a self-contained petrol-driven 2-wheeled machine for

The Fordson 'Power Major' pulling a FR THR 3001 8-ft. disk harrow mounted on two carrier wheels

The Kidd ' Rotaflail ' forage harvester gives an impression of immense strength and clean design

cutting material up to 9 in. diameter.

Jones Balers Ltd. were showing their Mk. IV baler, the ' Royal ' baler and the ' Major ' baler. Each of these machines can be either engine or p.t.-o. driven and are particularly designed to meet the needs of overseas buyers.

K

The mechanised farm requires equipment for handling food, produce and other materials. *Geo. W. King Ltd.* are specialists in this field and, in addition to lifting and moving tackle, they were showing their equipment for grain handling, as well as special fittings for the dairy, piggery and poultry houses.

L

Landmaster Ltd. exhibited their full range of cultivating machines, including the ¾-h.p. ' Gardenmaster 34 ', a cultivator for small gardens and experimental stations; the 1½-h.p. ' Gardenmaster 80 ', for larger gardens and commercial growers; the ' Landmaster 1.40 ', a 3.4-h.p. 2-wheel rotary digger; and the ' Colwood B1 ', a 1.2-h.p. single-wheel motor hoe. They have also a new water pump attachment with a capacity of 1,000 g.p.h. and a 20-ft. lift.

M

The *Marshall Organisation* were exhibiting ' four Track-Marshalls ', each fitted with different equipment and implements, to demonstrate the versatility of this 50-h.p. crawler tractor. The tools shown were a hydraulic bulldozer, a heavy-duty toolbar for use in conjunction with subsoilers, heavy cultivators and trenchers, a hydraulic angledozer, and a heavy-duty winch.

A new high-clearance row-crop tractor, two foragers and a hydraulically-operated reversible plough were among the exhibits on the *Massey-Ferguson* stand. It is interesting that all the machines shown can be operated by one man; they included such labour-saving devices as an automatic potato planter, which will cover 8 acres in a day, two sizes of combine-harvesters, two sizes of balers, and silage-making machinery, suitable for both large and small farms; in fact, a complete range of farming equipment embracing every operation from seed time to harvesting. The ' 65 ' high-clearance 50-h.p. tractor gives a ground clearance of 27 in. under the axles and is particularly suitable for large acreages of row crops. The ' 740 ' forager has been designed to meet the needs of farmers who want a small machine capable of giving high output with the medium-sized ' 35 ' and ' 20 ' tractors.

The latest attachment for the ' Gardenmaster ' 80 and 34 cultivators is a water pump of 1,000 g.p.h. capacity

There was a complete range of weedkillers on the stand of *May & Baker Ltd.* to meet the needs of agriculture and forestry and of road and railway engineers: ' Agrotox ' MCPA for cereals, grassland and linseed; 'Tropotox' MCPB for clovers, cereals, grasses and peas; ' Tropotox Plus ', an improved formulation for heavy infestations of cruciferous weeds; ' Compitox ' CMPP for dealing with chickweed and cleavers; ' Varitox ' TCA for pre-sowing treatment of sugar-beet and peas to control wild oat and for post-harvest control of couch grass; and there was ' Sponotox ', the mixed 2,4-D/2,4,5-T formulation for killing brushwood or scrub.

The ' Micron Twin ' – a powerful automatic concentrate sprayer for mounting on the 3-point linkage of a tractor – was on view at Smithfield for the very first time. The makers, *Micron Sprayers Ltd.*, stated that it is normally set to produce uniform droplets of 80-micron size, though the rotary atomisers can be adjusted to vary the droplet size. The ' Micron

One man can plant an acre of potatoes an hour using the new Massey-Ferguson ' 718 ' potato planter

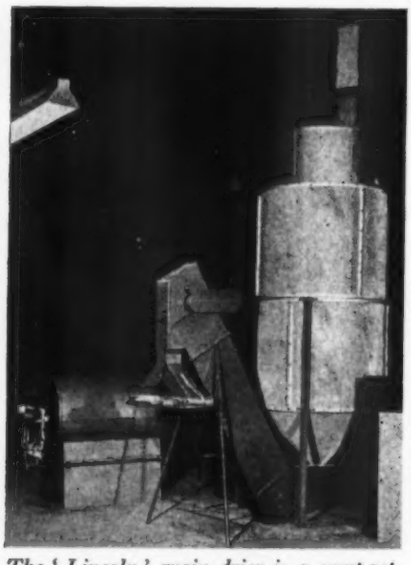
Meg', another tractor - mounted sprayer, and the 'Micronette', a wheel-mounted or knapsack sprayer, were also shown.

N

Ch. J. Neuman Ltd., manufacturers of 'Nubrex' greasing equipment, were showing for the first time a heavy steel grease gun specially designed for large tractors and combine-harvesters. It has a capacity of 28 oz. of lubricant, which it discharges at a pressure of 15,000 lb./sq. in.

A new 4,000-c.c. engine which develops 56 h.p. at 2,200 r.p.m., which has been specially designed to operate the Allis-Chalmers gleaner-combine-harvester, was presented by *Newage Engineers Ltd.*, together with a number of other Newage/B.M.C. models for powering smaller combine-harvesters and towed combine-harvesters. They showed, also for the first time, the new 3-in. 'Alcon' centrifugal pump, powered by a *Lister* LD1 air-cooled diesel engine, together with ¾-in., 1-in. and 1½-in. 'Alcon' centrifugal pumps and a small Alco D501 a.c. generating set suitable for bungalow lighting.

The new centrifugal broadcasters which were shown by *W. N. Nicholson & Sons Ltd.* are tractor-drawn and will spread fertilisers in a 180° arc at the rear of the machine; when travelling at 5 m.p.h. this will give a 30-ft. swathe. In addition, they had their improved rear toolbars, a lime distributor, tedders and haymakers.



The 'Lincoln' grain drier is a compact, self-contained unit, complete with electric motors and starters and requiring no foundation work

On the stand of the *Nuffield Organisation* were five variants of the Nuffield 'Universal Three' and 'Four' demonstrating independent p.t.-o., the diesel engine, hydraulic lift, belt pulley and the full-scale tractors – shown in section. The 'Universal Four' is powered by the latest B.M.C. 3.4 diesel engine, and the engine, front axle, clutch and gearbox can all be removed without dismantling the tractor. The 'Nuffield Three' combines many of the features of the larger model with the lower running costs of a 2.55 diesel engine.

The principal exhibits of *Nu-way Heating Plants Ltd.* were the new Y24E and Y30F oil-fired air heater and fan units developed specifically for hop driers. The makers state that they are equally suitable for grain driers on medium and large farms, for malt kilns, and for wool drying. The whole range of Nu-way oil-fired driers,

The new pressed steel 'Horn-draulic' loader in its mid-tractor position

rated from ¾ gal to 15 gal. per hour, together with pressure-jet oil burners for glasshouse and dairy use, were also shown.

O

Opancol Ltd. were showing the 'Neptune' high-pressure water pump for washing down, the 'Quicklift' auger-type grain conveyor of about 11 tons per hour capacity, and the 'Quicktest' grain moisture and hygrometer for testing grain in bulk or in sacks. They also demonstrated the 'Vacuum Silo' system of ensiling, involving the use of a plastic seal and a vacuum pump to improve the quality of the silage produced.

Despite marketing uncertainties due to the failure to reach agreement in the matter of European Free Trade, the number of overseas visitors, particularly from European countries, was well maintained and even promises to exceed the previous figure of 1,800. The arrangements made for their reception by the *Agricultural Engineers' Association* were, as they should be, excellent. On arrival the visitor was given a special badge, the services of an interpreter were placed at his disposal, and he was introduced to the *Overseas Club*, a sumptuously furnished room, where special facilities were provided for meetings and private discussions.

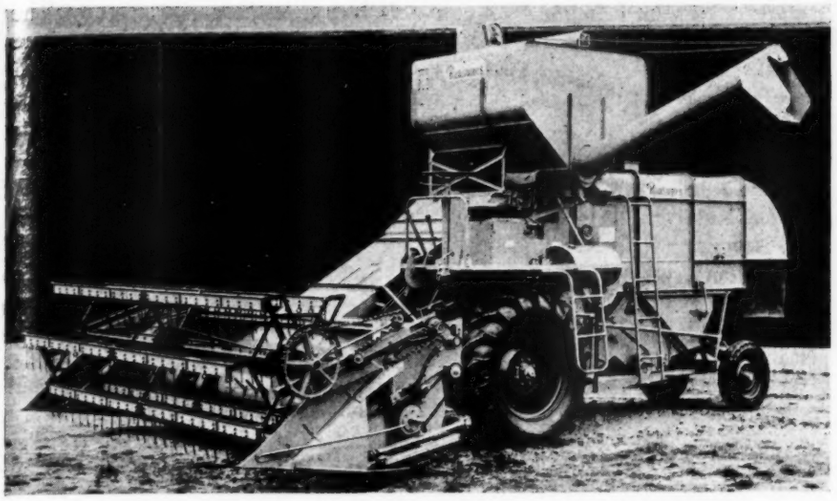
P

All kinds of frame, spring-tine and zigzag harrows were to be seen on the stand of *P. J. Parmiter & Sons Ltd.* A new introduction is the spring-tine drag harrow – an implement for preparing a seedbed–the depth of cultivation, being controlled by means of adjustable carrier wheels. The top linkage is spring-loaded and adjustable for uneven working conditions. In addition to their trailing harrows, there was a tubular frame chain harrow which can be lifted hydraulically to give light harrowing.

Last year *Penney & Porter Ltd.* did not have room to show the 'Rainforth' grass and small seeds drill, so this year they showed the latest model, which has an improved agitator in the seed box and transparent plastic tubes from this box to the coulters, so that it is possible to check the uniformity of the rate of flow. They were also showing another version of the 'Winnograder' – a 2-tons-an-hour model, which incorporates a rotary adjustable screen, and, in addition, a 4-tons-an-hour version of their aspirator-type pre-cleaner, which has a larger riddle size and larger fan capacity than the 2-ton model shown last year.

A newcomer to this country is the *John Deere* 440-IC crawler tractor from the U.S.A. It is powered by a *Perkins* diesel engine of 35 h.p. and has four forward speeds and one reverse. Operator comfort and ease of handling on American principles of design will, it is claimed, give more accurate work, whether in ploughing, cultivating or drilling. Two other interesting exhibits seen for the first time were the Lanz 6-ft. 6-in. combine-harvester and the Lanz potato harvester. The latter comprises an elevator digger fitted with a pick-up conveyor band with either a bagging attachment or trailer loading.

Petters Ltd. had on display no less than 15 examples of their range of



The model 902 Ransomes self-propelled combine-harvester is impressive

diesel and petrol engines, both air-cooled and water-cooled, and single-, twin-, 4- and 8-cylinder models of various capacities.

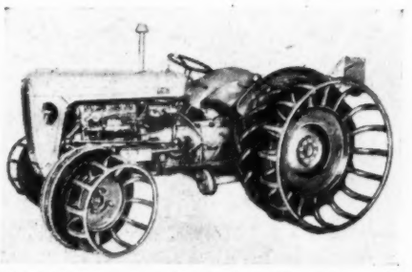
R

The accent on the stand of *Ransomes, Sims & Jefferies Ltd.* was this year more on crop working than on earth working, since no less than seven of their implements were for either crop conditioning or harvesting. Their most recent introduction was the TM1021 rear-mounted mower, which is of the cutter-bar type and can be supplied for both categories of linkages. A powerful spring allows the entire machine to float over uneven ground and the cutter bar is free to follow the undulations independently. Both of their combine-harvesters were on view.

Amongst the new *Romac* products seen for the first time was their latest addition to their range of compressors – a tractor-mounted unit for operating large-capacity hedge cutters and heavy pneumatic tools. Also making their debut were the RT/M4 petrol-engine-driven air compressor and special lightweight nylon plasters, made entirely from nylon and rubber for the repair of tyres of all types of farm vehicles.

Root Harvesters Ltd. were exhibiting an improved version of their 'Whitsed' model RB harvester, which can be used for both potatoes and carrots; all its ball races are dirt-shielded so as to ensure long life to the wearing parts, and its crop-cleaning efficiency has been improved. The 'Turnhill' carrot digger is an inexpensive machine for the small grower; it is fitted with a top-slasher and the crop is lifted and laid on top of the ground.

Every 'Rotavator' seen on the stand of *Rotary Hoes Ltd.* was being shown for the first time. They included the Howard '700' – a 7-h.p. unit fitted with the 'Selectaspeed' gearbox, which gives the correct speeds for rotavating, ploughing, carting and grass cutting, for a speed range of ¾ m.p.h. to 15 m.p.h. There was also an interesting 'Selectatilth' model of the tractor-mounted 'Rotavators'; the ability to vary the rotor speeds permits the tilth to be varied to suit different soil types and conditions.



Tubular cage wheels by Templewood, Hawksley Ltd.

S

Silorators Ltd. directed special attention to their new 'Dandy' forage harvester, a machine of extreme simplicity and yet high performance – a quiet machine which does not need a silencer. The 'Auto-Drop' forage wagon, also shown, provides an improved method of unloading at the silo without the driver having to leave his seat.

Simms Motor Units Ltd. had on display a wide range of accessories for agricultural equipment, tractors and stationary engines, including their 'inertia starter' type SX, a manually-operated starter for diesel engines, which can be fitted in place of the electric starter. There are situations where hand starting is preferable to electric starting, *e.g.* where battery maintenance and electric servicing is a major problem. The 'Nozzlescope' for inspecting jets, previously described in WORLD CROPS, was also on show.

F. A. Standen & Sons Ltd. showed a complete range of their potato, carrot and sugar-beet harvesters and cultivating implements for attachment to the 3-point linkages of tractors. Their inter-row rotary hoe has four independent cutting heads which are free-floating and follow the contour of the ground closely. They also have a special rotary hoe for strawberries for working two rows at a time.

New exhibits on the stand of *Stanhay (Ashford) Ltd.* were the power-driven equipment for their seed-spacing drill and the Stanhay-Tapsell bale loader. The former is to replace the normal land-wheel drive, and it gives completely positive seeding rates, even when working in sticky conditions, and rough or stony seedbeds, and it enables 8- or 10-row drills to be used with accuracy; the bale loader, which is of tubular steel construction, can be quickly and easily fitted to the 3-point linkage of the Fordson 'Major' tractor.

Construction in pressed steel sections of the new 1958 series of 'Horndraulic' loaders is a new departure for *Steel Fabricators (Cardiff) Ltd.* The main features noted were the new

The powerful Howard '700' 2-wheeled tractor fitted with single plough and wheel girdles to give added traction

mid - mounting attachment, which makes it easier for the driver to get into his seat, a quick-release trip mechanism and direct-thrust cylinders with a maximum load capacity of 13 cwt., lifting to 9 ft. 8 in. The ' Pixtone ' mechanical stone picker will be ' good news ' for those whose agricultural or pasture land is stony. The machine will clear land of stones and small rocks cheaply and efficiently at the rate of about 4 tons an hour; it is a tractor-drawn machine needing only one man.

T

Taskers of Andover (1932) *Ltd.* exhibited a wide range of agricultural trailers and wagons and other agricultural implements, such as the Paterson buckrake, earthscoop and grader blade and the Arthur rotary slasher. For overseas buyers there was a special 5-ton sugar-cane trailer.

Teles Smith Ltd. were exhibiting their range of fast-cutting chain saws, powered by petrol, electricity or compressed air, and for one-man or two-man operation. The ' Tiger ' hedge-cutter, powered by electricity, is particularly light and handy.

New introductions on the stand of *Templewood, Hawksley Ltd.* were the ' Junior ' provender press for the production of cubes and pellets from dry meal mixtures, a sturdy cage wheel attachment for tractors and the Schurmann ' Multi-Culta ' down-the-row thinner for sugar-beet. This is, in effect, four machines in one, since it is capable of precision drilling, fertilising, thinning and inter-row cultivations. Two or three of these operations can be carried out simultaneously.

There was a mobile crop-conditioning unit – the Trojan ' Airator ' – on the stand of *Trojan Ltd.* The capacity of this machine has been increased, as it now has a twin-cylinder diesel engine. There was also a model of their ' In-Tray ' grain drier, a unit with a total holding capacity of 14 to 16 tons of grain and comprising a wet pit, dry pit, holding hopper and drying tray.

The importance of correct fertiliser placement was emphasised by *Transplanters (Robot) Ltd.* Their latest introduction was the ' Non-Contact ' fertiliser attachment for fitting to their 2-, 3- and 4-row potato planters. With this device it is possible to sow the fertiliser 2 to 3 in. on both sides and 1 in. below the seed. This two-band placement serves two purposes: it economises in fertiliser and avoids scorching the young roots.

Implements displayed by *W. Tyzack & Turner Ltd.* included machine sickles for mowers, binders and combine-harvesters; disks for ploughs, harrows and drills; disk coulters; plough breasts and fittings; cultivator points and shares, and other cutting parts for agricultural machines. Hand tools included the ' Elephant ' brand scythe blades, knives, reaping hooks, files and saws.

Reader Service

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V

To meet the growing demand for tiny engines, a new small-capacity, 4-stroke engine made its debut on the *Villiers* stand. It is described as the Mk. 7/1, a unit of 74.6 c.c. with a 1.2-b.h.p. rating at a shaft speed of 3,600 r.p.m. The display included the complete range of Villiers and JAP engines from a 34-c.c., 2-stroke unit developing ⅓ b.h.p. up to an 824-c.c., twin-cylinder, 4-stroke engine developing 15 b.h.p.

W

All-weather cabs are today a ' must ' and the big range of cabs, for the leading makes of tractors, shown by *Weathershields Ltd.* naturally attracted a great deal of interest. The cab for the new ' Dexta ' is of all-steel construction and has a translucent fibreglass roof with outstandingly good all-round vision. It has lift-off doors and a simple detachable roof.

An entirely new type of potato digger was introduced by *M. B. Wild & Co. Ltd.* The machine digs up two rows at a time and the soil is sieved by two power-driven oscillating sieves, moving in opposite directions. The potatoes, complete with haulm, are lifted without shock and when cleaned are gently deposited on the ground in a narrow row. This is particularly important with early potatoes. Another new product was their Mk. II silage harvester with a pick-up which enables it to handle very heavy crops of grass.

Among the exhibits of *John Wilder Ltd.*, the new ' Sila-Masta ' 40-in. cut flail-type forage harvester took pride of place and the ' Manners ' hydraulic hitch is a new device for the rapid exchange of trailers. The harvester is a machine for use with the smaller tractors and is suited for farms of small acreage; the new hitch reduces the time taken in changing trailers from 5 minutes to 30 seconds.

Wolseley Engineering Ltd. were showing electric fencing equipment and accessories, including a new battery box and a new spear mounting post. There were also new attachments for the ' Merry Tiller ' rotary cultivator, including the 17-in. ' Suffolk Punch ' mower and a 22-in. side-wheel mower. Another very interesting exhibit was a working combined hammer-mill mixer and grain drier.

A complete range of ' Climax ' and ' Bedford ' disk and spring-tooth harrows, a p.t.-o.-driven haytedder, a range of saws and saw benches and ' Climax ' grain lifters suitable for combine - harvesters, binders and mowers were exhibited by *Walter A. Wood Co. Ltd.*

The *Wright-Rain* irrigation indicator was introduced for the first time; it is an instrument designed for the correct management of irrigation. It combines the function of a rain gauge with an evaporation pad that transpires at the same rate as the growing plants and shows on a sight glass the current moisture deficit of the soil. This company were also exhibiting their manure-rain pump for combining the application of farmyard manure with an irrigation system. This equipment will be of interest to all farmers and market gardeners who practice intensive pig, poultry and cattle keeping.

The feature
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will be resumed next month